2160

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

L:4:6
NA
2160
Meteria medica proper.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

L:4:6
NA

CMG- 2160

SHRI JAGADGURU VISHWARADHYA JNANAMANDIR
(LIBRARY)
JANGAMAWADIMATH, VARANASI

Please return this volume on or before the date last stamped
Overdue volume will be charged 1/- per day.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

chair, on which the patient sits, enveloped completely, except by one or two blankets. Action and uses are the same as those water bath. **The Russian Bath** consists in exposure of the body moist vapour at different temperatures. It is said to be risky to persons in weak hearts, and there is certainly more danger of heat stroke than the **Turkish Bath** in which only dry air is used. Either of these baths is useful in rheumatism, gout, malarious fever, renal and skin diseases.

E. Air Bath.—Hot air Bath may be employed like a steam bath, by simply burning a spirit lamp under a chair, or introducing the nozzle of a specially made spirit lamp under the bed clothes, which are supported on a frame work. An excellent method of treating chronic stiff joints is to enclose them in a copper chamber and then apply dry heat at 180° F.

SCALE OF TEMPERATURES OF BATHS (Startin).

Bath.	Water.	Vapour.	Hot Air.
Cold.	33° to 65° F.		
Cool	65° to 75° F.		
Temperate ...	75° to 85° F.		
Tepid	85° to 92° F.	90° to 100° F.	96° to 106° F.
Warm	92° to 98° F.	100° to 115° F.	106° to 120° F.
Hot	98° to 112° F.	115° to 140° F.	125° to 170° F.

Bolus.—A bolus is a large pill containing over ten grains of powdered ingredients. In England, when a bolus is ordered, it is dispensed as one large firm pill. Such is also the case in Calcutta. But in Ireland and elsewhere, it is sent out as a soft paste or confection wrapped in waxed or oiled paper, folded like a powder, with directions to scrape it off with a spoon and to swallow it down like jam. The most convenient plan, when a large dose of nauseous powder is to be administered, is to give it in a cachet or wafer paper.

Buginaria. Bougies are elongated cylindrical preparations containing active drugs mixed with the suppository basis for introduction into the urethral and the nasal cavities. Bougies are made like suppositories but differ from them in shape. They can be made in a metallic mould, but the basis must first be liquefied and thoroughly mixed with the drugs otherwise as the bore of the mould is narrow, there is a likelihood of its becoming clogged as the mixture solidifies.

A most convenient method is to pour the melted mixture into a long glass tube of suitable calibre and allow it to set. It can then be pushed out by means of a glass rod and cut into the required lengths; the end being rounded off by rolling it between the fingures.

Cachets are wafer-paper capsules. They consist of two concave or watch glass shaped halves or discs of wafer-paper stuck together at the rims by moisture. Any nauseous or bitter drug can be thus enclosed

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

between the two halves and swallowed without being tasted. Cachets should be dipped in water immediately before swallowing.

Capsules.—A capsule is a gelatin sac enveloping a dose of some nauseous or disagreeable drug.

Carbasa Antiseptica. Antiseptic Gauzes are mulmuls steeped in some antiseptic solution and dried afterwards. It is not easy to prepare them on a small scale. When the antiseptic is volatile, resin and oil should be combined with it. The following is the process for an extemporaneous preparation. Take two yards of gauze having 30 threads to the linear inch, hang it over a string, and spray over it uniformly the required volume of antiseptic solution on each side, turning once or twice until the whole of it is used. Or the folded gauze may be dipped into the solution in a deep dish, and turned over and over until the whole of it is equally absorbed, and then taken out, unfolded and dried.

Cataplasmata. Cataplasms. Poultices consists of linseed meal, bread or starch made into a soft paste with hot or cold water for local application. They may be **hot** or **cold, medicated** or **non-medicated.** A hot poultice is the best means of locally applying warmth and moisture as well as medicaments. To prepare a hot linseed poultice, the linseed meal is mixed with boiling water with constant stirring : it should never be made by boiling the meal and water together. It must be of smooth consistency, and not lumpy, and it must be nicely moist, neither too wet nor too dry. Now, spread quickly and evenly over a piece of muslin of the required shape and size, keeping its margins about 2 inches free for turning over the poultice. After application it must be covered with flannel to maintain heat, and kept in place by a bandage. If it is made with powdered cake instead of crushed linseed, some linseed or olive oil is to be added. Bread, flour with milk or water, also make good poultices. Hot bran poultice though lighter soon gets cold unless put in a flannel bag.

If the poultice is intended for a sore, boil or abscess, the poultice material must be in direct contact with the skin.

Ice poultice can be prepared by spreading over a twofold piece of gutta percha tissue, a thin layer of cotton-wool, and over it a layer of powdered ice and a little salt ; and then covering the ice with the remaining half of the gutta percha and sealing the margins with chloroform. The whole thing being placed within a flannel bag. Sometimes a layer of linseed-meal is put on the ice. Useful in pneumonia and pleurisy.

Tokmalanga or *Tokmari* (seeds of *Ocimum Basilicum*) make a capital demulcent and emollient cold poultice when soaked in water for a few minutes.

Neem poultice.—A poultice of the leaves of *Melia azadirachta* is a very valuable soothing application.

Cerata. Cerates are ointments whose basis contains wax. They are official in the U. S. P. They are harder than ordinary ointments, but softer than plasters.

Cigarettes are made in the same way as ordinary cigarettes, except that certain drugs are substituted for tobacco ; as Arsenical and Datura Cigarettes.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

LIBRARY.
Jangamwadi Math, VARANASI,

Chloroform Tinctures.—These are tinctures of drugs made with chloroform instead of alcohol ; as Chloroformum Aconiti and Chloroformum Belladonnæ, B.P.C. (see Aconite and Belladonna.)

Collunaria are lotions used as nasal douches.

Collutoires are throat or mouth paints ; as Glycerinum Acidi Borici. Collutoir is a French term.

Collyria are eye-lotions or eye-washes. Sometimes they are called eye-drops.

Cremora. Creams are soft or semiliquid preparations for external application ; having glycerin, vaseline or some similar substances as a basis *e.g.*—Cold Cream.

Dentifrices are preparations for cleansing the teeth. They may be a powder, paste, soap or liquid.

Depilatories are preparations used for the removal of superfluous hair. Their effects depend upon the presence of a sulphide and a caustic alkali. The freshly prepared paste is applied in a thick layer over the affected part and allowed to remain for 5 or 10 minutes. It is then scraped off with a blunt knife and cold cream applied to the inflamed skin. Deep and painful ulcerations may result from incautious application of chemical pastes. Those containing orpiment are more dangerous than those having barium sulphide.

Elæosacchara. Aromatic Sugars or **Oil Sugars.**—These are more common on the Continent than in England, and are made by triturating 9 minims of volatile oils to 1 ounce of sugar. They are used as flavouring agents. Anise, Fennel and Peppermint have *elæosacchara*.

Elixiria. Elixirs.—These are week tinctures of drugs rendered pleasant and agreeable by the admixture of sugar and aromatics.

Emulsiones. Emulsions are mixtures of insoluble drugs minutely divided and suspended in water by mucilage or other substances. An emulsion can be made by (1) *soponification*, by adding an alkali or Tr. Quillaiæ or Tr. Senegæ to a fixed oil ; and by (2) *suspension* of a resinous substance in mucilage or yolks of eggs : as emulsion of the oil of turpentine.

Enemata. Enemas. Clysters. Levements. Rectal Injections.—A liquid preparation introduced into or through the rectum by means of a suitable instrument is called an enema.

If the injection is meant to evacuate the bowels, 1 to 2 pints of liquid are injected, the patient lying on his left side ; but when it is intended that it should be retained, a small quantity—2 to 4 ozs., should be used. If it is considered desirable to introduce 3 to 6 pints, the liquid must be slowly thrown up the bowel while the patient is lying first on his left, then on his right side with his pelvis raised, or if necessary, on his knees and elbows, pressing the anus with a towel, whenever there are expulsive cramps. This is best done by slowly pouring the fluid into a funnel to which a long gum elastic tube is attached. It then flows steadily as the result of hydrostatic pressure and is less likely to be ejected. This process is called *Enteroclysis*. It must be borne in mind that the process of injection should be carried on slowly and with occasional pauses, otherwise the enema will be expelled by premature contraction

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of the intestine. The temperature of the liquid should be about 98° F. Cold water is soon rejected.

The following are the chief varieties of enemas with their uses :—

1. **Anthelmintic Enemata** are chiefly used to expel thread-worms. (See Anthelmintics.)

2. **Antispasmodic Enemata.**—For this purpose an injection of Oil of Turpentine, Asafetida, Bromides, Hydrate of Chloral, Ether, &c. is given when the intestine is distended with flatus or getting cramped ; as Enema Terebinthinæ, Enema Asafetidæ, &c. Enema Tabaci is very depressant and should not be used.

3. **Astringent Enemata.**—These are used for checking diarrhœa, rectal hæmorrhage and mucous discharge from the rectum and lower bowels.

4. **Emollient Enemata.**—A decoction of starch, linseed or barley soothes the irritable mucous membrane of the rectum and colon.

5. **Sedative Enemata.**—These are used in painful affections of the rectum, bladder and uterus. Opium is used for this purpose.

6. **Purgative Enemata.**—These are often resorted to when the lower bowels are to be evacuated. Ordinarily, for an adult 1 pint, for a child of 4 years of age 4 to 6 ozs., and for an infant 1 oz., are enough. Soap and warm water, thin gruel and castor oil or olive oil &c. are often used for this purpose. Glycerin 2 to 4 drs. injected by means of a suitable syringe, or a glycerin suppository introduced into the rectum, evacuates the bowels speedily (see p. 49), and may be used in native practice without much objection.

7. **Nutrient Enemata.**—In cases where food cannot be swallowed by the mouth or retained by the stomach, peptonised milk, beeftea, eggs beaten up either alone, or with brandy or milk, &c., may be injected ; but not more than 4 ozs. at a time. Irritability of the rectum may be checked by the addition of a few drops of Liquor Opii Sedativus. Rectal digestion is greatly facilitated by the combination of pancreatin and pepsin with nutrient enemas. Before giving the nutrient enema, the bowels if loaded, should be cleared by an enema of warm water or gruel.

8. **Suppositories of predigested food** can be introduced where the rectum rejects liquid nutrient enemas. These can be obtained ready made. Each meat suppository of B. W. Co. contains the digested equivalent to ½ oz. of fresh beef, and each milk suppository, the digested equivalent to 5 drs. of fresh milk. These suppositories are known as **Enules.**

Fomenta. Fomentations consist of flannels, cloths or sponges wrung out of hot water to which a drug may or may not have been added, for application to the surface of the body.

The proper way to apply fomentations is to take a twofold piece of flannel large enough to cover the affected part. Immerse this folded flannel in a kettle of boiling water or pour boiling water over it in a basin, and lift it by a pair of tongs or a stick, and put it on a wringer—a stout towel or duster with sticks attached to both ends. The water is then squeezed out as much as possible by the twisting of the sticks in

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

opposite directions and the flannel is immediately applied to the affected part and covered with a large piece of indiarubber sheeting or oiled silk, extending about an inch beyond the flannel. Place over this a thick layer of cotton wool, and bandage. If the full effect of fomentation is desired, the flannel should be changed every twenty or thirty minutes. In many cases, a sponge or a piece of spongio-piline wrung out of boiling water forms a convenient form of fomentation. In the case of the feet, hands or forearms, dipping them in hot water may do, but its temperature should be maintained by frequent small additions of boiling water.

If it is desired to produce a gentle counter-irritation, oil of turpentine may be sprinkled over the flannel before application. This forms the **turpentine-stupe.** For an anodyne or sedative action, Laudanum may be sprinkled in the same way or a few poppy-heads or a little Opium may be put into the water before boiling.

Dry fomentation is made by filling bags with hot bran, salt, sand or chamomile flowers. Bottles filled with hot water and covered with flannel bags or old stockings may be used for dry fomentation. A piece of flannel roasted over fire and applied also serves the purpose.

The method of applying fomentations by the natives of India is dangerous and faulty. The process above described is never attended to. Only a piece of flannel is just squeezed out of boiling water and applied, and when cold, it is again dipped into the boiling water leaving the fomented part exposed. The result is that the part fomented is exposed to alternate chills and heat. Even after fomentation, the part is not always covered. The student should learn the art and make it a point to see the fomentation done before him.

Hot antiseptic compresses.—These consist of folds of lint or cloth soaked in hot antiseptic lotions covered with a piece of water-proof or gutta percha tissue ; as Boric Acid Compress.

Fumigation is a local or general bath of volatilized drugs. Sulphur and mercury are chiefly used for this purpose. Mercurial fumigation, either *general* or *local*, has long been used in the treatment of secondary syphilis.

General mercurial fumigation is carried out in the following way :—The best apparatus for a mercurial vapour bath is that of Henry Lee. It consists of a spirit lamp enclosed in a case of wire gauze, on the top of which is a small plate surrounded by a porcelain trough. About an ounce of water is poured into the trough and the lamp is lighted. When the water begins to boil, 20 to 30 grains of resublimed Calomel are sprinkled on the plate, and the apparatus is placed under a chair, on which the patient sits undressed, but surrounded by a moleskin or indiarubber cloak tied round his neck, though kept away from his body by a cane hoop. If necessary, the slit of the cloak can be opened from time to time, to allow the vapour to be inhaled. The patient should be in the bath for about ½ hour and then removed to bed with his cloak on. The patient must not be left alone during the bath, lest he should faint.

Local mercurial fumigation is serviceable in obstinate syphilitic affections of the skin and mucous membranes.

Sulphur fumigation cures scabies.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Gargarismata. Gargles.—A gargle is a liquid preparation used for topical action on the mouth, throat and pharynx. A gargle may be any of the following kinds :—

1. **Tonic Gargle,** that tones the muscles of the pharynx and soft palate ; as cold or iced water.

2. **Antiphlogistic gargle,** that removes any local inflammation ; as Potassium Chlorate, Borax, Liq. Ammonii Acetatis with warm water, Linseed tea, &c.

3. **Stimulant gargle,** that stimulates the mucous membrane and glands ; as Capsicum (Tr. Capsicum 2 drs. to water 8 ozs.), Arnica, Myrrh, Pyrethrum, Eucalypti Gum (2 drs. to 8 ozs.), &c. These gargles often relieve deafness due to obstruction of the Eustachian tube by increased pharyngeal secretion.

4. **Astringent gargle,** that checks excessive secretion ; as Iron salts, Zinc salts, Alum, Tannic Acid (½ dr. to 8 ozs.), astringent infusions, &c.

5. **Antiseptic gargle,** that removes foul secretions and odors ; as Carbolic Acid, ½ dr. to Rosewater 6 ozs. (Brunton). Boric Acid, Potassium Permanganate, &c.

6. **Demulcent gargle,** that removes burning and irritation ; as barley water, linseed tea, Isaphgul seed (*Plantago Isphagula*) tea, milk, olive oil, &c., in irritant poisoning.

Gossipia Antiseptica. Antiseptic Cottons are made by charging absorbent cotton wool with various antiseptic drugs. This is done by soaking cotton in some saturated antiseptic fluid and afterwards drying it ; as Gossip. Acid. Borici, Gossip. Acid. Salicylici, &c.

Granules are minute pills. Granular preparations are very popular. The B. P. effervescing preparations are granular. (See p. 21).

Guttæ. Drops are liquid preparations used as drops ; as eye-drops, drops for the ear, &c.

Haustus. Draught.—A liquid preparation or mixture when taken in a single dose is called a draught ; as Castor Oil draught, Hydrate of Chloral draught, &c.

Injectiones. Injections.—A liquid introduced into the body by means of a suitable instrument is called an **Injection.** The Injections can be introduced into the :—

(1) *Natural Canals* or *open cavities* of the body ; as external ear, Eustachian tube, nose, nasal duct, stomach, rectum (see Enema), urethra, bladder, vagina and uterus.

(2) *Closed sacs* ; as tunica vaginalis, serous cavities, synovial cavities, sheaths of tendons, cysts and chronic abscesses.

(3) *Veins* ; as transfusion of blood, infusion of milk and saline solutions.

(4) *Subcutaneous tissues and muscles* ; as hypodermic injections.

Insufflationes are powders blown into the throat, nostrils or larynx. Laryngeal insufflation can be managed thus :—A vulcanite tube curved

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

at a suitable angle, having an aperture covered by a slide, through which the medicinal powder is introduced, is carried over the tongue to the laryngeal orifice, and the powder is either blown in by the mouth or by an elastic ball attached to the end of the tube. This instrument is called the "Pulverflator." A quill or a tube half filled with powder and blown by the mouth, may do for nostrils and throat.

Jujubes are lozenges made of gum arabic and sugar. They are prepared by boiling to a suitable consistence, gum arabic 16 lbs, sugar 7 lbs. and water ½ gal. They are sometimes covered with a coating of crystallized sugar.

Lanoliuum is an ointment or cream having hydrous wool fat as its basis; as Lanolinum Hydrargyri.

Linctus. Lincture or **Loch** is a thin confection to be slowly swallowed in small doses, so as to act on the throat. The basis of linctus is either treacle, syrup, honey or any other sweet substance. When powders are the active ingredients they should be made very fine, before admixture with the basis.

Linteum. Lint is lint impregnated with medicinal agents; as Linteum Acidi Borici, Linteum Iodoformi. These are prepared in the same way as antiseptic cottons.

Massæ. Masses consist of ingredients mixed together to the consistence of a pill. They are official in the U.S.P.

Masticatories are solid pieces of drugs used for chewing; as Pellitory Root.

Mollinum is an ointment prepared with mollin or superfatted soap. It is easily washed off with water forming a lather and leaves the skin fresh and supple. As Mollinum Hydargyri. Mollin contains 17 p. c. of uncombined fat and 30 p. c. of glycerin.

Nebulæ are solutions of drugs sprayed into the throat by the help of a spray-producer; as Nebula Acidi Lactici. Paroleine.

Opodeldocs or **Saponimenta** are preparations having as their basis soap liniment. Medicated Opodeldocs are official in Continental Pharmacopœias.

Pasta. Paste is prepared like ointment but generally without any fatty basis; as Pasta Arsenicalis, Pasta Amyli Iodidi (Tilbury Fox). It is better to confine the term *Pasta* to preparations for external application, and *Massa* to those for internal use; as Massa Copaibæ U.S.P.

Pastillus or **Pastil** is a soft jujube variously medicated having glycogelatin as its basis instead of gum arabic and sugar. These are used like lozenges. As Pastillus Acidi Borici T. H.

Perles are minute pills.

Pessi. Pessaries resemble suppositories but are intended for introduction into the vagina. The active drugs are mixed either with cocao-butter or with gelatin mass. These may be *sedative*, *astringent* or *antiseptic*.

Pigmenta. Paints are liquid preparations used for application to the throat, skin or other parts. A pigment differs from a collutoire in that the former is used as a paint for any part of the body, whereas the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

latter is for brushing the throat or mouth only. As Pigmentum Acidi Borici, Pigmentum Acidi Tannici, Pigmentum Argenti Nitratis Ethereum, &c.

Pomades are greasy preparations, resembling ointments, but used as dressings for the hair.

Steatina Steatins. Ung. Extensa or **Salve Mulls** are ointments of a hard consistence spread on muslin, and capable of being folded and cut at pleasure. Mutton or beef suet form their principal basis.

Sticks or Pencils are solid cylindrical rods prepared by fusing drugs and pouring the melted mass into suitable moulds; as Toughened and Mitigated Caustics. When the melted mass is poured into a conical mould it is called a **cone**; as Menthol Cone.

Styles are thin bougies about 2 inches long for introduction into the lachrymal sac and nasal duct.

Tabellæ Hypodermica.—Hypodarmic tablets are made with granular sodium sulphate or sugar of milk. They contain a definite quantity of the active ingredient and are easily soluble in water, so that they are very convenient for making hypodermic injections.

Triturationes. Triturations are solid dilutions. These are intimate mixtures of substances with sugar of milk. They are official in the U.S.P.

Vapores. Vapours. Inhalations.—These are drugs in a gaseous or atomised form brought in contact with the mucous membrane of the respiratory tract. The methods of inhalation vary with the temperatures at which drugs volatilize. Chloroform, Ether, Bichloride of Methylene, Nitrite of Amyl vapourize at ordinary temperatures; but to volatilize Sublimed Sulphur and Calomel, high temperatures are necessary (see Fumigation p. 70). The majority of drugs are vapourized through the medium of hot water or steam. Inhalation of Vapours is best carried on from an inhaler. (see Drugs that act on the Respiratory System).

Vaselinum.—Like Lanolinum, Mollinum, it is a term applied to an ointment having vaseline as its basis.

Wafer papers are used to wrap round nauseous or bitter powders to disguise their taste. They are made of flour and water and become limp when moist. Cachets consist of the same material (see p. 66).

PRIYA PARIJAT SEN.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PART II.

PHARMACY AND DISPENSING.

HINTS FOR PRACTICAL PHARMACY AND DISPENSING.

The extemporaneous formulæ or prescriptions given by a physician are called *Magistral*, because they are ordered by a *Magister*, *i.e*, master of his profession. The compounding and dispensing of these prescriptions are the ostensible duties of a dispenser. For the satisfactory discharge of these duties certain combinations of qualities are requisite in the individual undertaking them. "With some degree of physical strength and agility, he should combine a quick perception, sound judgment and firmness of resolution. He should maintain a constant and lively attention to every operation, however trifling, with which he may be occupied and evince both by night and by day a readiness to fulfil his duty in serving others, even at the sacrifice of his own convenience and pleasure."

The following hints, specially prepared, are likely to prove useful both to the dispenser and practitioner.

GENERAL DIRECTIONS.

1. **The Dispensing room** must be well *lighted* and well *equipped* with every necessary article, furniture and apparatus for compounding and dispensing purposes.

2. **Pure Drugs of the best quality** procurable for money are to be used, and preparations are to be made in strict accordance with the *official* and other *recognised methods*.

3. **Bottles are to be duly labelled.**—Those containing corrosive fluids must have *enamelled inscriptions* or names engraved on glass. Bottles containing **poisonous** substances must bear an extra label—"**Poison**" at their shoulders. It is a good plan to have also the *doses* printed on the labels.

4. **Poisonous Drugs** must be kept within a separate glass case under lock and key.

5. **The Counter and the apparatus** for compounding and dispensing must be kept scrupulously clean, in good order, and ready for immediate use. Always clean and put away every article in its proper place after use.

6. **Testing of Drugs** must be done occasionally so as to ensure their purity and strength. Substances like vegetable extracts, spirit of nitrous ether, hydrocyanic acid dilute, &c., require occasional looking after.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

7. **Corks of good quality** should be used. Cracked, old, rotten and soiled corks should always be rejected. The practice of pressing corks between the teeth should never be indulged in. Fit a cork before pouring the medicine into the bottle.

8. **Evidence of slovenliness** as regards externals does not encourage faith as to the care with which the contents have been dispensed.

9. **Prescription reading.**—Read through a prescription calmly and rapidly, without creating any suspicion in the mind of the presenter, but noting at the same time any inconsistency either in dosage or in combination.

10. **Consultation with the prescriber** must be arranged without delay wherever possible, if there is any **poisonous** or **unusually large dose**, or a grave **incompatibility** in a prescription. The dispenser should on no account alter a physician's prescription without his sanction.

11. **The Directions** on the label should be written first of all before the medicine is dispensed. At the same time the prescription should be copied in the copy book, noting afterwards any peculiarity of compounding or dispensing. If the directions are in Latin, the dispenser should give their English translation. In India, the directions should be written in the familiar language of the place, when the medicines dispensed are meant for those who cannot read English.

12. **Labels** should be neatly and distinctly printed without much flourish, and their margins carefully trimmed. **"Poison," "Shake the bottle," "Not to be taken"** and other accessory labels are best placed on the **shoulder** of a bottle. If affixed at the foot, the fingers holding the bottle may cover them, or a hurried patient may overlook them. The color of labels for liniment and lotion ought to be different from that for mixture and powder. Orange-red and dark-yellow for the former and white for the latter may be used. Sometimes the labels for liniment and lotion are printed with red ink on white paper.

13. **Bottles for dispensing** mixtures should be of a different color from those used for liniments and lotions. Amber-colored or uranium bottles are best suited for silver nitrate lotions, and blue bottles for liniments. Bottles covered with blue paper can be used for silver lotions, when uranium or amber-colored bottles are not available.

14. **The dispensing of two prescriptions simultaneously** should never be attempted. But if an infusion is to be made, the dispenser may set it on, noting on a bit of paper the time and the substance, and placing it between the cover and the pot.

15. **The position of a prescription during dispensing** must be such that the dispenser can read it while dispensing. This can be best accomplished either by fixing it to a hook on a

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

counter-self, or by holding it between the index and the middle fingers of the left hand.

16. **Manipulation.**—Be expeditious in manipulation. Finish tying, sealing, labelling and wrapping as quickly as possible. The holding of powder envelopes between the lips, the handling of drugs, the stirring of mixtures with the fingers, is to be avoided.

17. **The final reading of a prescription** is essential before the medicine leaves the hands of a dispenser, so as to make a revision of his work. If there is any doubt, always begin where there is none

18. **Wrong Delivery**—Be careful not to deliver a wrong medicine to the presenter of a prescription. A serial number entered upon both the original prescription, the copy in the dispenser's book and the label applied to the medicine, ought to prevent the occurrence of mistakes.

19, **Graduation of bottles** must be accurate. Want of symmetry of the bore makes a great deal of difference. Blown lines of graduation are generally wrong. Paper graduation is the best, but it must be done by hand in each case. Mark-papers should either be notched or lined equidistantly, but in either case, the number of doses should be put down in figures on the label.

20. **Repetition of prescriptions.**—If a prescription contains such drugs as are likely to produce a cumulative effect, as Strychnine, Arsenic, Lead, Digitalis, &c., the dispenser should warn the patient against repeating it for a lengthened period, without the knowledge and sanction of the prescriber. To prevent indiscriminate renewals of medicines containing poisnous ingredients, the physician should write "*non-Repetatur*" or some similar direction on his prescriptions

WEIGHING AND MEASURING.

1. **Scale.**—An upright fixed beam and scale with a moveable glass pan should be used. If a hand scale is used, hold it firmly by the left hand, never lift it too high above the counter, and judge of the weight as much by the indicator as by the position of the scale. A delicate scale should be used for weighing minute quantities of powerful drugs ; such as Strychnine, Hyoscine, Arsenic, &c.

2 **Corroding substances.**—Substances which corrode or act on the brass should be weighed upon glass pans. Crystallized acids, iodine, carbonate of ammonia and similar salts should never be weighed on brass pans.

3. **Soft or sticky substances,** such as soft extracts, confections, ointments, &c. should be weighed on a piece of paper spread over the right pan, after placing a corresponding piece of equal weight on the left along with the weights. Scrape the medicine by a spatula from the paper after weighing.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

4. **No guess work** in weighing or measuring is allowed. Every drug must be either weighed or measured as the case may demand.

5. **Label upwards.**—In pouring out liquids, always keep the label of the bottle upwards in order that it may not be spoiled by the trickling down of the drops of liquid left on the lip of the bottle.

6. **Minim measure.**—From a few drops to a drachm, the liquid should be measured in a minim glass. The true level of the surface of the liquid in a minim glass is the midway between the highest point close to the glass and the lowest at the centre.

7. **Castor Oil, Copaiba, Glycerin,** &c. should be weighed instead of measured if not otherwise directed.

8. **Lip drops.**—The drops that hang from the lip of a bottle out of which a liquid has been poured, should be caught upon the bottom of the stopper, before putting it back into the mouth.

9. **How to drop.**—Before permitting drops to fall into any mixture, the dispenser must allow a few drops to fall on the floor, till he is confident that he has a perfect control over dropping. If he is not sufficiently skilful, let him measure the drops into an empty glass until he is satisfied that he has obtained the correct number.

10. **Volatile liquids,** such as, Ether, Chloroform, Nitrite of Amyl, Diluted Hydrocyanic Acid, &c., should always be measured instead of dropped. A solution of 10 or 20 per cent may always be kept in stock for measuring out small quantities when ordered.

11. **The size of drops** varies considerably, and therefore it is safe to give *minims* where *guttæ* are ordered. Thus, chloroform dropped from an ordinary phial will require 150 to 300 drops to one fluid drachm.

12. **Division of a grain or a minim** is best accomplished by triturating or mixing the weighed or measured quantity with sugar of milk or any liquid excipient, and dividing the mixture as ordered. For instance suppose that 24 pills are ordered, each containing $\frac{1}{30}$ grain of Strychnine Hydrochloride. The total amount in the 24 pills will be $\frac{24}{30} = \frac{12}{15}$ grain therefore weigh out 1 grain of the salt and triturate it with 14 grains of milk-sugar, making 15 grains in all. Then 12 grains of this mixture will contain $\frac{12}{15}$ grain of Strychnine Hydrochloride. Take this amount and destroy the remainder.

13. **A liquid drug is always weighed** and never measured on the Continent.

WATERS.

1. **Camphor water.**—2 ozs. of water dissolve only $\frac{1}{12}$ gr. of camphor. The easiest way of making a good camphor water, is

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

to mix flowers of camphor with coarsely powdered glass, enclose and tie the mixture in a muslin bag and suspend it by a thread into the water from the cork. A good solution is obtained sooner by moving the bag up and down two or three times a day.

By dissolving 2½ drs. of spirit of camphor in 40 ozs. of water, camphor water may be quickly obtained.

2. **Chloroform water** is made by the simple shaking of chloroform in water.

3. **Mint waters** are best prepared by agitating oils in hot water, before pouring into the still and immediately commencing distillation.

4. The following **alternative method** of preparations is sanctioned by the B. P. for use in India and the colonies :—

"Aquæ Olei Anethi, Anisi, Carui, Cinnamomi, Fœniculi, Menthæ Piperitæ, Menthæ Viridis, Pimentæ. Each of these waters may be prepared by triturating the corresponding Oil with twice its weight of Calcium Phosphate and five hundred times its volume of Distilled Water and filtering the mixture. In India and other tropical countries these waters may be used in place of the corresponding *Aquæ* of the text of the Pharmacopœia."

DECOCTIONS.

1. **Drugs** should be coarsely powdered or sliced before they are boiled in water for 5 minutes or longer. If the comminution is too fine some sediment deposits. The drugs should always be put in cold water before boiling.

2. **Decoction pots** should be enamelled or tinned and covered. A false bottom made of tinned or silver gilded copper wire half an inch or more above the bottom should be used to prevent imparting a fusty odor to the decoction from the particles of the drug adhering to the bottom of the vessel during boiling.

INFUSIONS.

1. **Drugs for infusion** should not be too finely comminuted.

2. **No other water than distilled water** boiling or cold is to be used.

3. **Suspension of drugs** is essential. A muslin bag containing the drugs can be suspended by a thread from the lid of a covered pot, or a Squire's or Maw's infusion pot may be used.

4. **Uniform temperature**, as far as possible, should be maintained.

5. **Hard spring water** does not give a good color, as the extractive matters are not well dissolved by it.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

6. **Whenever wanted** the infusion should be made fresh. If business is very brisk, the infusion can be made and preserved for two or three weeks, by bottling hot infusions in 6 or 8 oz. bottles up to the brim, and then by covering their mouths and necks with bladder or by well fitted stoppers, so as not to allow any air to get in.

7. **Concentrated infusions** can never supply the place of fresh ones. They are however useful for field hospitals. The concentrated infusion of digitalis is inactive.

EMULSIONS AND MIXTURES.

Emulsion as its name implies is a liquid externally resembling milk. The milkiness is due to the suspension of resinous or oily bodies in water, by means of an adhesive substance known as the *emulsifier*.

Fixed oils and **Viscid Substances** are best emulsified in a mortar, and volatile oils, alkaline emulsions and less viscid substances in bottles.

1. **The first fundamental rule** *in the compounding of a mixture, is to avoid chemical decomposition taking place among its ingredients, unless such is the implied intention or the express order of the prescriber.*

2. **Distilled water** is the official water to be used in compounding. Tap or other waters produce a considerable change in mixtures. For example, Tinct. Card. Co. produces a brilliant crimson color with tap, and a reddish-brown with distilled water. Tinct. Lavand. Co. gives a bright mixture with distilled, and a muddy one with tap. Liquor Arsenicalis precipitates Calcium Carbonate with tap water Hydrargyri Perchloridum produces an insoluble mercuric salt when dissolved in tap water. Tap water gives a muddy colour to a mixture containing Ferrum Tartaratum and distilled water makes a clear solution.

3. **Order of mixing.**—It is not the spirit of practical pharmacy to mix the ingredients in the order in which they are arranged in a prescription. The dispenser should exercise his own judgment in determining the best method of effecting a combination.

It is a good plan first to pour in the tinctures and spirituous fluids as they are measured, next add syrups and essences, and lastly fill up the bottle with the vehicle.

4. **Poisonous Drugs** such as Arsenic, Strychnine, Perchloride of Mercury, Aconite, Digitalis, Belladonna, Opium, Hydrocyanic Acid Dilute, &c. should be separately dissolved and then added to the mixture last of all immediatly before corking the bottle. In this way you avoid the possiblity of putting them in twice over.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

5. **Mortar and pestle** should never be used if the ingredients are easily soluble. Dispense syrups and fluid preparations in such an order that the vehicle will finally rinse out the measure glass.

6. **Shaking.**—All mixtures should be briskly shaken before labelling, to ensure a thorough incorporation of the ingredients.

7. **Heat** should be used to help the solution of salts when they will not entirely dissolve in cold water, for they are sure to crystallize on cooling. Suspension is the best method under such circumstances.

8. **Wholly or partially soluble vegetable drugs,** especially which contain tannin, should be *mixed with earthy and metallic salts in largely diluted solutions.*

9 **Gelatinous mixtures.**—Some mixtures become *gelatinous* on keeping, due to the growth of an organism called *viscous ferment.* An addition of 20 per cent of alcohol to the mixture prevents this.

10. **Chemical reaction.**—If there is a chance of a chemical reaction taking place, the ingredients which are likely to act with one another, should be freely and separately diluted or suspended, before mixing. The mucilage of acacia always suspends the precipate uniformly, and retards or modifies to some extent the chemical decomposition.

11. **Froth.**—Sometimes a lot of froth rises as the result of shaking, especially if the mixture contains vegetable solutions, thus preventing the bottle from being filled or corked. A few drops of alcohol removes this.

12. **Insoluble powders,** such as rhubarb, chalk, &c., should be triturated with a small quantity of water in a mortar to produce a thin paste, before mixing with the vehicle.

13. **Medicinal filtrates** produced in a mixture should not be filtered but suspended. But, if any foreign particles float on a clear solution, they should be removed either by straining or by filtration through wetted cotton or tow plunged lightly into the neck of a funnel. All mixtures depositing a sediment should bear the label "*shake the bottle.*"

14 **Mucilage** should be recently prepared, but it can be kept ready made for some time provided that the bottle containing it is full up to the neck and properly sealed.

15. **Oils** are best emulsified either by rubbing them up with gum, or by mixing them with an alkali, or with both. Copaiba is well emulsified with gum and alkali. Essential oils require to be mixed either with some fixed oils before emulsification or with the yolks of eggs.

16. **Scale preparations** in a mixture are either to be dissolved in a mortar with warm water or poured into the bottle filled with the vehicle, and shaken briskly. If poured in a dry condition into the bottle, and the water or vehicle added afterwards, a sticky mass cakes at the bottom.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

17. **Volatile ingredients in a mixture.**—Volatile drugs such as ammonia, ether, chloroform, hydrocyanic acid, sulphurous acid, &c., should never be mixed with hot fluids, and should always be added last of all, after the vehicle has been poured into the bottle. Care should be taken that sufficient space is left for the requisite quantity of the soluble ingredient. As soon as this has been added, the bottle must be tightly corked and well shaken.

MIXTURES AND EMULSIONS OF SPECIAL DRUGS.

1. **Acacia** in a mixture is best added in the form of a mucilage, which should be freshly made.

2. **Almond oil** does not emulsify well with mucilage or powdered gum, but a small quantity of liquor potassæ or carbonate of potassium without mucilage answers well.

3. **Ammoniacum, Almond and Guaiacum** should be triturated first with a little water or some similar vehicle so as to form a thin paste, and then gradually mixed with the emulsifier.

4. **Ammonium Carbonate** should be dissolved in a cold vehicle, only translucent pieces being used. Those portions which have effervesced are wanting in strength.

5 **Benzoic acid** should be powdered before mixing. If there is a tincture in the formula it should be dissolved in it, and water added gradually with shaking.

6. **Bismuth Oxynitrate** is chemically incompatible with potassium bicarbonate or sodium bicarbonate producing a large quantity of carbonic acid gas when mixed in a mixture. $2BiONO_3 + 2NaHCO_3 = Bi_2O_3CO_3 + 2NaNO_3 + H_2O + CO_2$. The gas must be allowed to escape by gentle heat before bottling. Otherwise the bottle may subsequently brust or the cork be suddenly blown out to the great alarm of the patient. An equivalent quantity of bismuth carbonate may be substituted as the finished mixture contains the same. Bismuth salts and iodides produce bismuth oxyiodide which gives a brownish-red color to the mixture though therapeutically it is harmless.

7. **Borax** powdered and rubbed up with mucilage makes a soft jelly-like mass. But a limpid mixture may be obtained by mixing freely diluted mucilage with a solution of borax in warm water.

8. **Butyl Chloral Hydrate** forms oily compounds with alcohol, insoluble in water. Dissolve in glycerin and warm water. Chloral hydrate behaves in the same way, and is decomposed by alkalis, liberating chloroform.

9 **Caffiene Citrate** forms a syrupy liquid when mixed with 3 times its weight of water; on addition of more water, caffiene hydrate is precipitated. This is again redissolved on further dilution.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

10. **Chlorate of Potassium and Hydrochloric Acid.**—Sometimes a formula composed of Pot. Chloras, Acid. Hydrochloric, and Water comes to the dispenser for dispensing. Here, the object is to make a solution of chlorine, and is best fulfilled by adding the acid directly to the salt, corking the bottle for a while before adding water, so as to make a solution of chlorine in water.

Chlorate of potassium with syrup of iodide of iron liberates *free iodine* which has proved fatal.

11. **Cocaine** in solution requires the addition of a little salicylic acid to prevent fungus growth.

12. **Cod-liver Oil** is well emulsified by the following method;—Place powdered tragacanth in a dry mortar and triturate with a little of the oil, then add the yolk of an egg and the oil and stir briskly, adding water as the mixture thickens, and lastly mix flavoring oils and water alternately, with constant stirring, avoiding frothing. The mixing of lime water 1 to 5 with cod-liver oil greatly facilitates its emulsification, and reduces its tendency to cause eructations. Lime water and acacia gum emulsify cod-liver oil just as well as the yolk of egg.

13. **Copaiba Balsam** can be well emulsified by rubbing it with one-third its weight of milk sugar, and about its own weight of powdered gum acacia, adding water gradually. Liqr. potassæ also emulsifies it well.

14. **Ethers** should never be mixed with hot liquids, and must be added last to a mixture.

15. **Ferri Sulph.** soon gives a rusty color to a solution from the production of ferric hydroxide, which is retarded by adding an acid.

16. **Glycerin** is used as a sweetening agent for mixtures, especially those that contain perchloride of iron. It is also used as an appropriate solvent for, and a preservative of, the pancreatic and peptic ferments. It prevents gelatinisation of kino in Tr. kino, and also to a certain extent prevents and retards chemical changes and precipitation in a mixture.

17. **Iodine** is very sparingly soluble in water, but iodide of potassium helps solution to the extent of three-quarters of its own weight. Salts of ammonia also increase its solubility by the formation of a soluble salt ammonium iodide. Some essential oils, such as oils of peppermint and fennel chemically combine with iodine. Strong solution of iodine with solution of ammonia, or with ammoniated camphor liniment, precipitates iodide of nitrogen, which is a most dangerous explosive. (see Explosive Combinations).

18. **Morphine Salts** should not be dissolved by heat, for at a temperature above 104° F. their solutions turn yellow or brown.

19. **Phenazone** is sometimes a troublesome drug to deal with in a mixture. It is rather a free base, and gives precipitates with tannin, alkaloids and many other substances. Thus, with alkaline

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

salicylates, it forms *salipyrin* (insoluble); with ferric chloride *ferripyrin* (orange-red); with free iodine *iodopyrin* (insoluble); with chloral hydrate *hypnal* (insolube), &c.

20. **Potassium Iodide** is decomposed by acids, liberating *free iodine*, which may produce fatal results. This also happens when potassium iodide is mixed with tincture of perchloride of iron.

21. **Quinine Salts.**—The following points in respect of the mixing of a quinine salt should be noted :—

(*a*) It produces an *insoluble salt* when added to a strong mineral acid; the acid should be freely diluted with the vehicle before the alkaloidal salt is mixed.

(*b*) When it is prescribed with spirit of nitrous ether, tinctures, ether, or any spirituous liquids along with glycerin or syrup and water, the quinine is to be first dissolved in the undiluted spirituous mixture and then glycerin or syrup added, and lastly the vehicle is gradually mixed. If no mucilage is ordered it may be added, to prevent quinine from adhering to the sides of the bottle.

(*c*) The sulphate should not be dissolved in diluted hydrochloric or nitro-hydrochloric acids unless so ordered.

(*d*) When ordered with bark or any other substances containing tannic acid, it deposits a precipitate of tannate of quinine which should not be filtered.

(*e*) No acid should be added by the dispenser to make a solution, if it is not prescribed. The quinine is then to be rubbed up in a mortar with a little mucilage and diffused in water, or added to the vehicle in its crystalline state, with "shake the bottle" as a direction. The former is the better method.

(*f*) Quinine salts are *incompatible with alkalis*, such as bicarbonates, carbonates, hydrates, spirit. ammon. aromat. &c. They should be suspended and diluted *separately* before mixing; a small quantity of mucilage will make a better mixture.

(*g*) Ammoniated tincture of quinine gives a precipitate when diluted with water, but the addition of a little mucilage (½ dr. to 1 oz. of mixture) suspends it.

(*h*) With liberated chlorine, quinine salts yield a yellow solution, *i.e.* when added to the chlorine mixture mentioned in para 10, page 82.

(*i*) Mercuric chloride throws down a poisonous precipitate, which can be dissolved by diluted hydrochloric acid. Glycerin and gum also retard to some extent chemical reaction.

(*j*) Donovan's solution too behaves in the same way, but an admixture of glycerin and mucilage prevents to some extent chemical changes.

(*k*) When it is ordered with salicylates in a mixture, an ugly looking mass, salicylate of quinine, forms inside the bottle and refuses to flow out. The mixture may be improved by rubbing mucilage with quinine and gradually mixing the salicylate dissolved in a large quantity of water, and agitating very briskly.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*l*) Neutral solution of quinine and iodide of potassium do not react chemically, unless there is an acid present, free or liberated, in which case iodine is set free.

(*m*) The growth of fungus in a solution of quinine is prevented by the addition of a 5 per cent solution of alcohol or a trace of chloroform.

22. **Spirit of Nitrous Ether** soon turns *acid* (HNO_3) from decomposition, and should therefore be made *alkaline* before being mixed with iodides, or bromides, otherwise free iodine or bromine will be liberated and will darken the mixture. It can be kept permanently alkaline or neutral by dropping a few crystals of potassium bicarbonate in it.

Spt. Æther. Nitrosi should be kept in amber-coloured bottle (blue or green is useless) in the dark, for daylight decomposes it.

23. **Salol** when combined with other salts in a mixture falls to the bottom in a somewhat granular form, this is prevented by adding mucilage in the proportion of .13 to 1.

24 **Strychnine** in a mixture containing alkalis is precipitated to the bottom of the vial and fatal results may follow the swallowing of an overdose. Bromide and iodide of potassium, Liq. Hydrarg. Perchloridi and Liq. Sodii Arsenat. all throw down insoluble precipitates of strychnine compounds.

25. **Tannic acid** should be dissolved in pure distilled water, as tap water makes the solution opalescent. It precipitates alkaloids in solution and gives with iron an inky color. Alkalis give precipitates, and turn the mixture brown to black. Mucilage makes it flaky.

26. **Terebene and Turpentine** are best emulsified with the yolk of egg. At least one egg is required for each ounce of oil of turpentine. Thick mucilage and Tr. Quillaiæ answer fairly well, but are not so good as the yolk of egg.

27. **Vegetable extracts** should be carefully *rubbed* in a warm mortar with a little water till a soft paste is obtained, with which the vehicle is to be gradually mixed. If they are resinous rub them with two or three times of their weight of powdered acacia in warm water, and then gradually mix with the vehicle when cold. *Ext. Filicis Liquid* may be triturated with powdered acacia, soap or milk.

PILLS.

1. **In making a pill-mass,** the following points should be observed :—

(*a*) "Put the substance (powder) prescribed in smallest quantity into the mortar first, and triturate it with the next smallest (if it is powder), add the next, again triturate, and so on.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*b*) Toxic substances (*e.g.*, alkaloids and arsenic) should always be triturated well with double their weight of a hard powder (*e.g.*, sacch. lactis), if there is none in the pill constituents, before adding the other ingredients gradually.

(*c*) Potent extracts which are prescribed in the pill should not be treated as excipients—*e.g.* Extr. Nucis Vom. gr. ¼ with Pulv. Aloes gr ij and Pulv. Ipecac. gr. ss. Here rub the extract with the ipecacuanha, add a little of the aloes, again triturate, and continue thus until the extract is equally divided throughout the whole.

(*d*) Essential oils should be treated like no (c). Thus, in the case of Pil. Aloes Socot., the oil of nutmeg should be triturated lightly with the powdered soap (the oil being added gradually), then aloes, trituration, aloes, trituration, &c."*

2. **The official pill-masses** :—The following can be conveniently and usefully kept in powder, *viz* :—Extr. Colocynth. Co., Extr. Rhei, Pil. Aloes et Ferri, Pil. Aloes et Myrrh, Pil. Aloes et Asafetida., Pil Cambog. Co, Pil. Colocynth. Co., Pil. Hydrarg. Subchloridi. Co., &c., noting on the label of each, the quantity of the powder that is equivalent to the pill-mass. Thus, Pulv. pro- Aloes et Asafetida gr. iv = 5 grs. Pil Aloes et Asafetida.

3. **Pills under one grain** should be made up to 1 grain by the addition of liquorice powder or sugar of milk. Fractions of a grain of such **powerful drugs**, as strychnine, perchloride of of mercury, sulphide of calcium, arsenic, &c., should be intimately triturated with crystallized sugar or milk, and then made into a pill-mass with soft manna, or other suitable excipients. For calculation of fractional weights see p. 77.

4. **Pills liable to crumble** will keep their shape for a reasonable time, if some fibrous materials, such as liquorice powder, paper pulp or lycopodium are added to the mass If the pill-mass is too soft, it should be hardened on a hot plate, but if the ingredients are hard and brittle, such as pitch, chian turpentine, &c, they should be massed in a warm mortar. When the pill-mass contains dry vegetable powders, some minutes must be allowed for the absorption of moisture before rolling.

5. **The same spatula** should never be dipped into the extract pot after it has been used to scrape the pill-mass from the tile, pestle and mortar.

6. **To prevent sticking together**, cinnamon or liquorice powder, mixture of starches, powdered French chalk are used. Pills containing hygroscopic and volatile ingredients should be varnished or coated and then dispensed in a well stoppered or corked bottle. Pills for silvering should never contain glycerin.

7. **Substances that are decomposed by Iron**, such as silver nitrate, copper and bismuth salts, corrosive sublimate, calomel ought not to be mixed in an iron mortar, or scraped by an iron spatula.

---

* Chemists' and Druggists' Diary, 1898.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

8. **Crystalline salts** soluble in water, should be very finely powdered, and massed with theriacanth and some inert powder. Before silvering, they must be varnished with tolu and dried. Glycerin of tragacanth is the best excipient for insoluble salts.

9. **Essential oils.**—Soap or sometimes soap and powdered liquorice root make a good excipient. Wax is to be avoided. When there is much essential oil, the addition of liquor potassæ help greatly.

10. **Potent Drugs.**—*To diffuse* potent drugs as aconitine, atropine or strychnine, add a minute quantity of glycerin before massing.

11. **Scale Preparations** should be finely powdered with a palette knife instead of triturating in a mortar before massing. Manna is a good excipient for such substances.

EXCIPIENTS.

An excipient is a substance either solid or liquid added to bind the ingredients of a pill-mass into a plastic and adhesive mass.

1. **Acacia** in powder is not a good excipient, though frequently used. It makes the pills too hard. With calomel it forms a regular cement.

2. **Bread Crumb** has fallen into disfavour. When mica panis is ordered, use wheaten flour and water *q.s.*

3. **Calcium Phosphate** in minute quantities gives a pilular consistence to greasy substances and essential oils. It is a good desiccant.

4. **Castor Oil** with or without soap is a good excipient for making camphor pills.

5. **Confections of Roses and Hips** are not used now, because they increase the bulk of pills.

6. **Compound Decoction of Aloes** in minute quantities is a good excipient for pills containing aloes and gum resins. It should not be used where there is an incompatibility with carbonate of potassium.

7. **Extract of Malt** is a good general excipient.

8. **Glycerin** keeps pills soft, but it is very hygroscopic. The addition of one-third of its weight of water overcomes its hygroscopic property.

9. **Glycerin, Mucilage of Acacia, Water and Alcohol** in equal parts make a good general excipient.

10. **Glucanth** as prepared by Lucas, consists of powdered tragacanth ½ oz., glycerin 1½ ozs., water ½ oz., syrup of glucose 3½ ozs. It is useful where glycerin of tragacanth is unsuitable on account of the large quantity of glycerin.

11. **Glucose Syrup** or glucose 12, glycerin 4, water 1, by weight is a serviceable excipient.

12. **Honey and Treacle** do not make the pills hard, and are at times used in preference to mucilage, &c.

13. **Kaolin** is useful for massing oxidisable and reducible ingredients, as potassium permanganate.

14. **Kieselguhr** (fossil earth) absorbs liquids (1 gr. = 1 m.). The mixture can be massed by glucanth.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

15. **Lanoline** may be used in massing certain scale preparations. Being non-oxidisable it may be used to mass Pot. Permanganas or Argenti Nitras with prepared kaolin.

16. **Liquorice and Marshmallow** in powder are absorbent and give elasticity to the soft mass.

17. **Manna** can be used for massing calomel, quinine, and bismuth salts.

18. **Proctor's Paste** consists of Pulv. Tragacanth. 1 dr., Glycerin 3 drs. and water 1½ dr. The paste improves by keeping. The B.P. Glycerinum Tragacanthæ may be used as a substitute. It is an all-round good excipient.

19. **Resin Ointment** is used for scale preparations.

20 **Soap Powder** is the best excipient for vegetable powders, extracts and gum resins. It neither hardens nor crumbles It should not be used for masses containing acids, acid salts, metallic salts and substances containing tannin.

21. **Syrup** alone is rarely used but makes a useful excipient with powdered althea.

22. **Spirit** softens resinous substances, but the mass should be quickly rolled, otherwise it will crumble.

23. **Theriacanth** is an admirable excipient for intractable drugs, as reduced iron, phosphate of iron. It is made by rubbing Pulv. Tragacanth. 1 dr. with rectified spirit 2 drs. and mixing quickly with warm treacle 2 ozs.

24. **Tincture of Gentian and Treacle** in equal parts make a good excipient giving firmness, toughness and solubility. It is recommended by Dr. Whitla for massing quinine.

25. **Tragacanth** powder gives in small quantities solidity and elasticity to a soft mass; more so when the compound powder is used.

26. **Water** should be used with caution. It is a good excipient for masses containing gum or soap and makes a good pill with powdered opium.

27. **Wax** is not much used now, for it makes pills indigestible, though it makes a beautiful pill-mass with camphor, creosote, carbolic acid and most of the essential oils. Cacao butter makes a good mass with silver oxide

28. **Ince's Precautions.**—The excipients to be avoided are.—

(*a*) "Those incompatible with any of the ingredients of the pill-mass. Thus, confection of roses must not be used to make up iron compounds; acetic extract of colchicum must not be stiffened with magnesia.

(*b*) Those which make the pill either too hard or too soft.

(*c*) Those which unduly increase size."

PILLS OF SPECIAL DRUGS.

1. **Acids.**—Mineral acids are rarely used in pills, but the addition of powdered marsh mallow and glycerinated water makes a good pill-mass.

2. **Aloes** is best made into pills, with a minute quantity of compound decoction of aloes, which has a great solvent power, or

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

with proof spirit. **Aloin** is massed with glycerin of tragacanth.

3. **Antipyrin** makes a good pill with tragacanth or glucanth.

4. **Argenti Nitras and Argenti Oxidum.**—The former is triturated with kaolin and massed with paraffin ointment, the latter with kaolin ointment.

5. **Bismuth Salts** are best made into pills with Proctor's paste or manna.

6. **Butyl Chloral Hydrate** makes a good pill-mass with equal parts powdered acacia, tragacanth and syrup.

7. **Calcium Sulphide** should be triturated with ½ gr. of sugar of milk for each pill, and massed with powdered tragacanth and glycerin. Each pill should be of 1 gr gross weight.

8. **Calomel** with manna makes a good pill.

9. **Camphor** should be powdered first with a few drops of alcohol, and after the evaporation of the spirit, Proctor's paste is to be added. Some like soap and fixed oil.

10. **Camphor Monobromata** should be triturated with Pulv. Tragac. Co. and massed with Proctor's paste

11. **Carbolic Acid** (crystallized) is massed with wheaten flour, powdered soap and liquorice, or powdered marsh mallow with a minute quantity of Proctor's paste.

12. **Citrate of Iron and Quinine** can be made into a pill by the addition of proof and rectified spirit and rolling the mass quickly. Resin ointment can also be used.

13. **Codeine** can be massed with half its weight of powdered liquorice and glycerin of tragacanth.

14. **Copaiba** when massed with carbonate of magnesia, makes a very hard pill which is insoluble in the intestinal secretions. If it be made into an emulsion with gum and be set aside for 12 hours, after adding 1 part of magnesia levis to every 10 parts of the Balsam, it may be converted into a good pill-mass by the addition of a minute quantity of borax, and such a pill is soluble Phosphate of calcium also makes a good pill.

15. **Creosote** with powdered curd soap B P. and powdered liquorice make a good mass. The following method is recommended by Martindale :—"Put the creosote in a wide mouth stoppered bottle, add the soap, and mix well. Then digest in a water-bath till they combine." **Guaiacol** should be treated like creosote.

16. **Croton oil** forms a good pill-mass with wheaten flour, mucilage and liquorice powder, or powdered curd soap with a little glycerin of tragacanth.

17. **Ergotin** makes a good pill with powdered althea or any inert vegetable powder, and sometimes with a minute quantity of tragacanth. It must be hardened by evaporation if too soft.

18. **Ferri Sulphas**—The granular sulphate forms a good pill with glycerin of tragacanth and a little powdered sugar of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

milk. **Ferri sulph. exsiccat.** does not make a good pill. It cracks after a while. However, the following method may be tried :—The iron salt is to be triturated with equal parts of powdered acacia and tragacanth and massed with a mixture of glycerin 1 and water 2.

19 **Ferrum Redactum** makes a good pill, when rubbed down to a fine powder, powdered liquorice added, and massed with liquid glucose or glycerin of tragacanth Theriacanth makes an excellent excipient. Extracts may swell the pills from the production of hydrogen, if they turn acid.

20. **Gallic Acid and tannic acid** make a good pill-mass with glycerin. (4 gr. with ½ m)

21. **Hydrargyrum c. Creta** can be massed with glycerin of tragacanth. It should never be vigorously triturated in a mortar, as mercury may separate.

22. **Hydrargyri Perchloridum** should be finely triturated with sugar of milk and made into a pill with glycerin of tragacanth.

23. **Hydrargyri Subchloridum** makes a good pill with manna.

24. **Menthol** should be worked like carbolic acid. If it liquefies during manipulation, add kieselguhr.

25 **Pepsin** can be massed with a mixture of equal parts of glycerin, syrup and water by quick rolling. 1 m. of diluted hydrochloric acid and 5 grs. of pepsin can be rolled into a pill.

26. **Phosphorus** can be made into pills by three methods :—(*a*) *Solution by Carbon Bisulphide* :—Phosphorus is first dissolved in bisulphide of carbon, and while the solution is going on, pour in two or three drops of chloroform, which gives rise to a thick vapour around the solution, and thus prevents ignition. A little powdered liquorice is now added and a workable mass is made by the addition of a little of Proctor's paste. (*b*) *Solution by Oil* :—Phosphorus is melted in hot mutton suet or oil of theobroma, in a wide mouthed bottle with an indiarubber cork, and well shaken till the fat solidifies. Then add liquorice powder and make a plastic mass. (*c*) *Combined method* or the *B P. Process* :—In this, phosphorus is dissolved in carbon bisulphide and the solution is carefully mixed with melted lard and beeswax, and made into a pill-mass with the addition of a little kaolin. The last method is better suited for India. The mass must be kept immersed in cold water in a blue bottle away from light. 3 grs. of the mass and 1 gr. of acacia powder can be rolled into a pill for dispensing.

Pills containing phosphorus require varnishing or a pearl coating.

27. **Potassium Acetate** is rarely used as a pill. Canada balsam makes a fair mass, but boro-tartrate of potash, a scale compound, makes a better one.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

28. **Potassium Iodide** must first be rubbed up with a little water, so as to make a thick paste, before liquorice powder is added.

29 **Potassium Permanganate** requires careful treatment, for it soon oxidises when brought in contact with organic matter, such as sugar, syrup, glycerin, vegetable extracts, &c. It can be made into a good pill-mass by mixing it with kaolin and a little water, or with Martindale's *kaolin ointment* which consists of equal parts of vaseline, paraffin and kaolin.

30. **Quinine Sulphate** with tartaric or citric acid makes an excellent mass Sometimes a drop or two of glycerin or water may be necessary in dry weather. The pills must be varnished or capsuled, otherwise they will become soft and sticky by damp. Glycerin of tragacanth, manna and strong sulphuric acid (1 drop to 4 grs.) are also good excipients. White excipients should be used for white drugs.

31. **Rhubarb Powder** is a troublesome substance for pill-making. Proof spirit or tincture of rhubarb (1 m. to 3 grs) makes a soft mass which should be rolled quickly. Simple syrup, treacle and equal parts of glycerin and rectified spirit may also be used.

32. **Salol** can be made into a pill with glucanth.

33. **Taraxacum Extract** causes fermentation and thereby swelling of pills. It should be mixed with powdered tragacanth after evaporation. Pills should stand for half an hour before silvering.

34 **Zinc Valerianate** makes a good mass with a little powdered acacia and spirit Glycerin of tragacanth and liquorice powder may answer well.

PILL COATING.

1. **The general rule** in the coating of pills is that *all pills requiring a coating, should be perfectly made, of a firm consistence, and free from contamination and powder.*

2. **Silvering** is done in a covered earthen-ware pot or a box wood pill-silverer. The pills being damped with thin mucilage are dropped on to a silver leaf put within the silverer. The cover is then put on and the silverer is shaken for about a minute. After the superfluous fragments of silver-leaf have been blown off, the pills are exposed to air for a few minutes to dry. One silver leaf covers six 5 grain pills, and two drops of mucilage are enough to damp a dozen of such pills. When the pills are too damp, more leaf is required for silvering, moreover the finish is not so elegant. A better and finer silvering can be obtained by putting the pills and leaf in a covered porcelain pot or a metallic silverer, heating the pot or silverer over a spirit lamp and rotating it as before.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pills containing asafetida and sulphides should not be silvered unless they are very *stiff* and *varnished*, otherwise the silvering will soon get blackened. Pills containing mercury produce an unsightly amalgam.

3. **Varnishing** can be done either by a solution made by dissolving 1 of residue of tolu syrup known as "spent tolu" in 3 of pure chloroform or ether, or by a solution (Martindale's) containing equal parts of sandarach and absolute alcohol. The pills being put in a smoothly glazed covered pot, enough of the varnishing fluid is added to wet them all, and the pot rotated as in silvering They are then transferred to a developing dish, separated from one another, and occasionally rotated until the coating dries and becomes hard. The chloroform or ether solution dries very soon.

4. **Gelatin-Coating**—A coating solution is made by dissolving 1 of gelatin in 4 of water on a water-bath, straining while hot, and cooling it afterwards. If there are air bubbles, the solution should be reheated. The pills are now stuck on the points of pins or needles and dipped into the warm solution. The needles are taken out slowly and rotated for a few seconds, and then stuck into a sheet of cork or pin-cushion by their opposite ends. As soon as the outside coating dries, the needles are withdrawn, and the holes close of themselves.

5. **Pearl-Coating** is very popular now. For a perfect and elegant coating, pills must be completely dry, which can be easily accomplished by keeping them in a sulphuric acid drier. If they contain any hygroscopic substances, they should be varnished before coating. Generally two kinds of solution are used;—(*a*) one which contains mucilage 1 dr., syrup 1 dr. and water to 1 oz.; and (*b*) another (Martindale's) which contains syrup ½ dr, tragacanth 4 grs. and water to 1 oz. A few drops of either of these are poured over the pills in a covered globe or pill-coater, which is rotated in order to damp them, as well as to moisten the inside surface of the globe. Exceedingly fine, powdered French chalk, which can be improved by adding 3 p. c. of mag. carb levis in order to help their solubility in the gastric juice, is dusted over the pills from time to time as the rotation is continued, until the coating is uniform. The pills are then transferred to a second clean globe and rotated rapidly until they are polished. If a high polish is desired, the burnished pills can be rotated in a third warmed globe having a thin coating of hard paraffin or white beeswax.

6. **Sugar-Coating** is rather a complicated process. Dr. Symes recommends the following as the most practical method:—"Pills well dried on the surface are placed in a tinned copper bowl with a flat bottom, or an enamelled iron dish, the surface of which has been moistened with syrup, or syrup and gum. They are then rotated and gently heated, very finely pow-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

dered sugar being dusted on, and the motion kept up till a perfectly dry, hard, and whitish coating is obtained, the operation being repeated if necessary."

7. **Keratin-Coating.**—Keratin solution is made by first removing from horn shavings all that is soluble in pepsin and diluted hydrochloric acid, dissolving the residue in alcoholic solution of ammonia or acetic acid, and then evaporating the solution to the consistence of a liquid gum. The pills are simply rotated with this solution in a pot and dried on a slab. The coating often gets sticky. Pepsinized keratin can be bought and dissolved in any of the above solvents. Drugs intended to pass undissolved through the stomach are coated with keratin or salol; as carbolic acid.

8 **Salol-Varnishing.**—The varnish contains salol 2, shellac 3, absolute alcohol and ether of each 3, and should be applied several times till a thick coating is obtained. Or salol can be melted by heat in a copper bowl and the pills rotated as in sugar-coating.

POWDERS.

1. **Compound Powders.**—The B.P. gives no directions as to the manner of mixing compound powders, consequently the dispenser is left to his own experience and resources in compounding them. The following hints, however, will greatly help him.

(*a*) **Powders must be thoroughly mixed** in a mortar or on paper. Powders mixed by a spatula on paper and sifted are more diffusible in water, than those rubbed up in a mortar; but there are exceptions to this rule. Take for example the following prescription;—℞ Sulph. Precipit. gr. xx, Guaiaci Resin gr. x, Magnesia gr. xx. Here the most miscible powder is obtained by triturating guaiacum and magnesia together in a mortar, before adding sulphur, whereas if mixed on paper, it would not diffuse in water. Powders for insufflation should never by triturated in a mortar, but only loosely mixed on paper.

(*b*) They should be **passed and repassed through a fine hair sieve** as often as possible. By repeated sifting and shaking in a bottle, the ingredients are thoroughly incorporated and a uniformity of color is obtained.

(*c*) They should be **very lightly rubbed** in a mortar, if this process is at all adopted, otherwise they would cake.

(*d*) **Ingredients in smaller quantities** should first be thoroughly mixed together, and afterwards larger quantities be gradually incorporated.

2. **Folding Paper and Boxes.**—Powders should be folded in ordinary writing paper, or better if possible, in demy, glazed powder-paper made for the purpose. Waxed or paraffined paper

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

is to be used for hygroscopic drugs. Coloured paper is used for powders for lotions. Folded powders should be of the same breadth and length, better done on a powder-folder. Powders under six are generally dispensed in a neat small oblong enevelope on which "The Powder" is printed; but those over six in a card board box or bottle with a label gummed outside.

3 **Waxed Paper and Tinfoil.**—Drugs that are **perishable**, as ergot; that are **volatile**, as camphor, essential oils; that are **hygroscopic**, as potassium acetate, carbonate and citrate, and sodium iodide &c.; that are liable to **decomposition**, as calcium sulphide, valerianates should be folded first in waxed paper, and then each covered with tinfoil and dispensed in a bottle.

4 **Powders in quantity.**—When a powder is ordered to be given in spoonfuls, it should be dispensed in a well-corked or stoppered, wide mouthed bottle.

5. **Salts** which mutually decompose each other must be mixed and stirred lightly together in a dry condition; as sodium sulphate with potassium tartrate, potassium nitrate with sodium salicylate, &c.

6. **Oxidising Substances** should be each separately rubbed to powder, and then lightly blended on paper with safe ingredients by a bone spatula. (See Explosive Combinations).

7. **Hygroscopic Powdered Drugs** should never be kept in paper packets They should be dried and preserved in wide-mouthed bottles or stone jars with accurately fitted stoppers or corks. Suspending a bag of dry quick-lime from the cork, helps also to keep powders dry. Powdered squill and ammoniacum can be kept dry in this way.

8. **Removal of Identity.**—Crystalline salts, as potassium bromide; roots, as ipecacuanha; leaves, as digitalis; barks, as cinchona, &c., should be finely pulverized before admixture.

9. **Division of Powders.**—There should be no guess work in division. **Each one must be weighed.** Many failures in examination are due to inattention to this simple procedure.

10. **Liquids** are rarely prescribed in powders, if so, white kieselguhr may be used to absorb them (1 gr. to 1 m.).

BLISTERS.

1. **Blister Spreading.**—A blister is best spread over an adhesive plaster, which has been previously spread upon glazed thin calico. First of all the dispenser should cut a "shape"—an exact size and form of the blister ordered—out of a square piece of writing or packing paper, leaving all round a margin 1 inch wide. This is best done by folding the square piece twice upon itself, and cutting by a pair of scissors the shape of the blister out of the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

middle, rejecting the cut out central piece. This *empty space is the shape of the blister.* The dispenser now cuts a piece of spread adhesive plaster or adhesive plaster-mull one inch bigger than the size ordered, and gently warms it to make it slightly sticky, and quickly lays the "shape" upon its sticky surface, and evenly presses it down. (In India the warming of the adhesive plaster is not often necessary during hot months) He then takes a quantity of the B. P. cantharides plaster sufficient for the size and softens it well between his thumb and fingers. Taking a small pellet, he spreads over the adhesive surface, with the side and front of his right thumb, while the fingers of his left hand keep the plaster *in situ.* He goes on making a series of rainbow-like strokes from left to right till the whole of the surface within the shape is covered. A long spatula not unlike a large dinner knife is gently warmed, and firmly passed over the spread cantharides, removing any superfluous plaster and making its surface smooth. The paper shape is now removed, and the edges are neatly trimmed, keeping a margin of the plaster three-eighth of an inch wide. A piece of oiled or waxed paper is now loosely laid over the blister and the whole put within a paper box.

2. **Powdered Cantharides, Blistering Liquid or Olive Oil** should not be sprinkled or applied to increase the action or improve the appearance of the blister.

3. **Paper-Covering** should be removed before use, otherwise the blister will not stick. Both the dispenser and prescriber should give directions to this effect. A better plan is to pin the margins to a piece of paper which is then stuck to the bottom of the box.

PLASTERS.

Most of the plaster-mulls of the market are made by machinery. Dispensing of such a spread plaster means the cutting of a piece ordered. It is only when a special plaster is ordered that the dispenser is required to make one on the counter. The spreading of a plaster requires great skill and dexterity.

1. **Plaster spreading.**—A plaster is made in the same manner as a blister, except that the method of spreading is different. Sheepskin, stiff chamois, dimity, moleskin or sometimes adhesive plaster-mull is used, but the white sheepskin is generally preferred when not otherwise ordered by the prescriber. The "shape" is cut in the same way as for a blister A piece of leather larger than the size of the plaster ordered, is cut off, and stretched out in all directions by pulling. The leather is now placed with its rough surface upwards on a thick pad of paper. and the gently warmed plaster iron is passed over it, to remove any wrinkles or inequalities. The paper shape merely dipped in

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

water is evenly pressed against this rough surface, and all the necessary appliances being in readiness the process of spreading is begun, in one or other of the following ways :—

(*a*) **Modern Method.**—The plaster is cut into thin slices put in a small enamelled pan with a lip and handle, and warmed over a gas flame or fire, stirring it constantly and not allowing it to boil. In the meantime, the leather, the shape, and the plaster iron or spatula are kept ready as already described. As soon as the plaster becomes creamy, it is poured over the leather within the shape at the left end, then with a long spatula or plaster iron it is spread rapidly over the surface, any superfluous plaster being removed and returned to the pot.

(*b*) **The Writer's Method.**—The easiest and most convenient method of spreading is to cut a piece of plaster from the stick, allowing 15 grs. for each square inch of plaster required and to put it on a sheet of strong smooth brown paper. Having prepared the shape and the leather melt the cut off piece to a creamy consistence by gently rubbing a hot plaster iron over it, and scrape the mass to the edge of the paper. The leather with the shape, having been brought alongside, with one or two sweeps the dispenser covers the whole surface, removing any superfluous plaster with a spatula. A second hot iron may be required at this stage.

A mixture of plasters can be made by a similar process.

2. **Plaster with an Adhesive Margin** is made in the following manner :—The shape is cut as before, and the central piece instead of being thrown away, is damped and stuck to the middle of the leather. The shape is again folded up, and a piece of the width of the intended adhesive margin is cut off; and the shape is pressed against the leather, thus leaving a free space between the centre-piece and the shape ; which space is now covered over with the adhesive plaster. When cold remove both the papers, and apply a second shape cut to the proper size, having previously coated it lightly with soft soap to prevent it from sticking to the adhesive margin. The plaster is now spread in the ordinary way, the shape removed, and any soap that may have adhered to the margin is wiped away with a wet cloth or sponge.

The Writer's Method.—The plaster is spread as usual and the shape is pulled off, and the margin of the leather is trimmed, leaving exactly the width to be covered over with the adhesive plaster. The dispenser now melts a small piece of adhesive plaster, in a gallipot, and with a spatula spreads it over the margin and finally smooths it by passing a hot spatula over. The advantage over the other methods is its simplicity, for it is more easy to cover the margin last, than to cover the central part after the margin has been covered.

3. **Plasters for bed sores** are spread on chamois leather without margins.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

4. **Mamamary plasters** must be circular in shape 7 in. in diameter, with an opening 1 in. in diameter in the centre. The margin is to be notched to fit these plasters to the curved surface of the breasts.

SUPPOSITORIES, PESSARIES AND BOUGIES.

1. **Basis.**—Oil of theobroma is the *official basis*. It should be liquefied on a water-bath in a casserole or a porcelain evaporating dish. In India and the colonies, where the prevailing temperatures are higher than in England a sufficiency of white beeswax may be added to raise the melting point to the necessary degree. *Gelatin basis* (Squire's) is made by soaking gelatin 1 oz. in water 1 oz. until absorbed, and then dissolving in glycerin 3½ ozs. on a water-bath. This can be kept ready-made, covered by a layer of alcohol, in a wide mouthed bottle. The relative proportions can be altered as required. Gelatin basis is used for making nasal bougies, uterine pessaries and suppositories.

2. **Ingredients** should be treated like those for ointments. Any powder or crystalline substance must be rubbed very fine with a little cacao butter, before mixing with the melted oil of theobroma.

3. **Moulds** must be perfectly clean and cooled with ice or cold water, and the inside surface wiped with a bit of rag or lint soaked with soap liniment. Wiping with almond oil is necessary for gelatin suppositories.

4. **Operations.**—Triturate as in para 2, and mix with the melted oil of theobroma with constant stirring, until a creamy mass without lumps is obtained, and then pour it into the moulds, or divide into equal parts when hard, and mould them with your fingers into the shapes of suppositories, pessaries and bougies. Finely powdered starch prevents them from sticking during manipulation.

SUPPOSITORIES AND BOUGIES OF SPECIAL DRUGS.

1. **Alkaloids.**—Alkaloidal salts are generally better absorbed than pure alkaloids, and therefore the salts instead of the alkaloids should be used dissolved in oleic acid.

2. **Aristol** makes very good bougies with cacao butter by the cold process.

3. **Boric Acid** makes a good mass, if Glycer. Acid. Boric. B.P. and gelatin basis are mixed together.

4. **Chloral Hydrate** should not be mixed with heated cacao butter, but rubbed up with cold cacao butter and a little wax, if necessary, and pressed into the mould.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

5. **Extracts** must be made into a smooth paste with water or proof spirit, and gradually mixed with the melted basis. **Ergotin** must be treated similarly.

6. **Hamamelis** suppositories are made of liquid extract of hamamelis evaporated to one-half, (5 ms. for each). Hamamelin or hamamelidin too (1 to 3 grs.) with cacao butter makes a good suppository.

7. **Ichthyol** should not be worked up with gelatin basis which makes it insoluble. Use cacao butter and add 1 gr. of beeswax to give it firmness.

8. **Iodoform** makes good bougies and suppositories with cacao butter by the cold process

9. **Despatching.**—These preparations should be sent out wrapped in absorbent cotton wool. In hot weather, they may be dispensed in a wide mouth, stoppered bottle containing iced water. If they contain volatile ingredients, each of them should be covered with waxed paper or tinfoil.

SYRUPS.

1. **Ingredients.**—Refined for unfaced cane sugar and distilled water should alone be used in the preparation of syrups. If any scum rises during boiling, it should be skimmed off. The quantities must be exact, otherwise either crystallization or fermentation may occur.

2. **Straining.**—Syrups are to be strained through a felt-bag, and carefully stored away in well stoppered or corked bottles in the dark.

3. **Fermentation.**—Care should be taken that no admixture of water or other fluids occurs, otherwise they will ferment and decompose.

4. **Syrups containing organic fluids** like the majority of the B.P. ones, keep better and longer if they are despumated. **Concentrated liquors** of standard strength may be used for any organic syrups that are liable to decompose on keeping.

5. **Syrupus Ferri Iodidi** requires boiling, so as to convert a portion of the sugar into glucose, with a view to preserve ferrous iodide in its pristine condition ; but pharmacists generally fail to do so. It is now therefore largely prepared from the liquor, which keeps bright and without oxidation indefinitely by the addition of a trace of hypophosphorous acid.

6 **Syrupus Ferri Phosphatis** darkens by keeping but can be extemporaneously prepared from a concentrated solution of iron in phosphoric acid, by addition of simple syrup.

7. **Easton's Syrup** darkens also by keeping, but a clear syrup may be made at any time by mixing 1 part of liquor ferri phosph. with 7 of a syrup containing the other ingredients.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

TINCTURES.

In the preparation of tinctures, three things are essential, *viz.*—(1) the **Solvent**, (2) the **Process**, and (3) the **Ingredient**.

1. **Solvent.**—The new B. P. has dispensed with the use of rectified and proof spirits, and in their stead has sanctioned alcohols of various strengths, making absolute alcohol the standard unit (see p. 52).

(*a*) *Alcohols of higher strengths* are used (1) for the *abstraction of alkaloidal principles*, as of aconite, strophanthus, &c.; (2) for the *solution of resinous substances*, as asafetida, benzoin, myrrh, Indian hemp, &c.; (3) for the *solution of volatile oils*, as cubebs, lavender, orange-peel, &c.; and (4) for the *solution of inorganic substances*, as iodine, ferric chloride.

(*b*) *Ammonia along with alcohol* is used in the preparation of ammoniated tinctures of ergot, guaiacum, opium, quinine and valerian.

(*c*) *Spiritus Ætheris* is the menstruum for Tr. Lobeliæ Ætherea.

(*d*) *Tr. Aurantii* is for Tr. Quininæ.

(*e*) *Glycerin, Chloroform and Distilled Water* are used for dissolving gummy, juicy, resinous, extractive, saline, metallic, nonmetallic and alkaloidal drugs.

2. **Process.**—Any of the following processes is used for making tinctures.

(*a*) *Solution.*—Alcohol is the principal solvent. Next to it is water. The necessary conditions for promoting a perfect solution are:—

(1) The Solute should, if possible, be comminuted to allow a large area for action by the solvent.

(2) Agitation must be continued, or the solvent passed and repassed through the solute, or the solute suspended in the solvent.

(3) Heat should, if necessary, be applied to expedite the solution.

(4) Stirring is necessary for dissolving a solid. Glass mortars should not be used if not annealed, as they may crack, from increase and decrease of temperature.

(*b*) *Maceration* is not considered as suitable or economical as percolation, because it requires 7 days' operation. But, if the ingredients are uniformly comminuted and soaked in the menstruum with frequent shaking, an efficient tincture can be obtained after 5 days. The B.P. process is to strain the tincture, press the marc, mix the strained and expressed fluids, filter, and add more menstruum to bring up the tincture to the prescribed volume.

(*c*) *Percolation.*—Moisten the ingredients with the prescribed amount of the menstruum and set aside for 24 hours. Pack the mixture in a percolator and gradually pour the menstruum over the mixture, maintaining a layer of liquid on the top, until three-fourths of the volume are used, or the exhaustion of materials is effected. Press the marc, filter the expressed liquid and mix with the percolate. Enough menstruum is then added to make up the prescribed volume.

A good percolation depends upon thorough soaking, depth and uniformity of packing, and slow passage of the liquid.

3. **Ingredients.**—These require to be carefully selected. Most of them are to be *powdered* according to the degree of comminution as prescribed by the B.P. (see p. 53-4). Some are to be *cut small*, some to be *bruised*, and some are used in their natural state.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

LOZENGES.

1. **The B.P. lozenges** are made like a pill-mass. Confectioners rarely use powdered gum acacia, though the B.P. directs the use of both the powder and mucilage.

2. **Ingredients.**—The essential ingredients for making lozenges are finely powdered or icing sugar, mucilage of picked gum arabic, and medicinal and flavouring agents.

3. **Operation.**—The ingredients having been thoroughly mixed and kneaded, the resulting paste is placed on a slab with adjustible edges and rolled out to the desired thickness. The lozenges are then cut out with a punch and exposed to the air for 12 or 24 hours, after which they are removed to a drying chamber.

4. **Stamping.**—While the lozenges are still soft, they are stamped with letters indicative of their composition.

5. **Packing.**—Lozenges should be kept in dry, well fitted stoppered bottles in a dry place. Dampness make them sticky. They are to be dispensed in wide mouth stoppered bottles.

OINTMENTS.

1. **The preparation of Ointments** is not always easy. Special tact and care can alone turn out a good product. The following general hints are worth remembering :—

(*a*) If the active drug is a *solid* or a *powder*, as galls, mercuric iodide, sulphur, &c., it should be reduced to a state of fine powder before admixture with the basis; so that the ointment may be free from grittiness.

(*b*) If it is a *soluble* or *deliquescent salt*, as potassium carbonate or iodide, it should be first made into a thin paste with water, before mixing with the basis.

(*c*) If it is a *hard extract*, a *balsam* or a *resin*, a preliminary treatment is necessary with such substances, as water, oil, glycerin, or rectified spirit, as the case may be.

(*d*) If it is a *liquid extract*, as in the case of belladonna ointment, it must be evaporated to the required consistence.

(*e*) If it is an *alkaloid*, as aconitine, atropine or cocaine, it should be dissolved in oleic acid by trituration and gentle heat.

(*f*) If it is a *crystallized drug*, as boric acid, salicylic acid, iodoform, tannic acid, &c., it should be reduced to a fine powder, and triturated with its own weight of the basis for a while before adding the rest.

(*g*) If it is a *volatile substance*, such as, menthol, chloral hydrate, hydrocyanic acid dilute, chloroform, it should be mixed after all the ingredients have been incorporated; so as to reduce its evaporation to a minimum.

2. **Basis.**—Whatever basis is selected, it should not be a

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

chemical incompatible, nor should it in any way affect the action of the ointment. Rancid lard or ointment should never be used. If the basis becomes too soft, on account of the prevailing high temperatures, as in India and the Colonies, indurated lard, prepared suet, or beeswax may be added as required.

3. **Incorporation of a liquid** with a fatty or oily basis is best effected by slowly adding the liquid drop by drop, and keeping up a steady rotatory motion. The mortar must be warmed beforehand.

4. **Spatulas.**—A bone or box-wood spatula is the best for scraping, stirring or mixing ointments.

5. **Two ointments,** or an ointment and a liquid or oily substance, are best mixed on a porcelain slab.

6. **Oleates** should not be melted in a metallic cup, but in a porcelain casserole.

7. **Tinctures and spirituous substances** are best incorporated with the fatty medium by spreading the latter evenly on the bottom and sides of a mortar and mixing the tinctures gradually.

OINTMENTS OF SPECIAL DRUGS.

1. **Acid Carbolic Ointment B.P.** is best prepared by using liquefied carbolic acid and a cold basis. Crystallized acid dissolved in a hot medium may bring on cooling.

2. **Chrysarobinum B. P.** when dissolved by heat partly recrystallizes on cooling, as happens in the B.P. ointment. It being more soluble in castor oil than lard, a mixture of the two gives satisfactory results.

3. **Glycerin** can be well incorporated with extracts by first rubbing the extracts with a little hot water in a warm mortar and adding glycerin gradually.

4. **Hydrargyri Perchloridum** is sometimes prescribed in the shape of ointment. It must be triturated well with glycerin (2 ms. to 1 gr.) before mixing with the basis, otherwise minute particles may violently irritate the skin. When ordered with potassium iodide, both of them should be triturated first before admixture.

5. **Iodine.**—First triturate, then add a few drops of rectified spirit and rub with its own weight of fatty basis, and lastly mix with the remaining basis.

6. **Iodoform ointment B.P.** should be made by the cold process. When exposed to sunlight it changes color from liberation of Iodine, and will then stain lint black.

7. **Paraffin Ointment B.P.**—Unless the melted paraffins are stirred well, the ointment is sure to be lumpy. White soft paraffin should be used for colorless ointments.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

8. **Resorcin** readily absorbs oxygen and becomes discoloured.

9. **Thymol Crystals** are very irritating to the skin. With camphor (1 to 1); thymol forms a liquid which can be worked up into an ointment.

10. **Despatching.**—Where expense is no object, ointments should be sent out in covered pots, a piece of waxed paper intervening between the cover and the ointment. When open pots are used, tinfoil should be applied over the waxed paper.

NON-OFFICIAL OINTMENT BASES.

1. **Gelatums or gelatin-pastes** were first brought to the notice of the profession by Unna. They are mixtures of gelatin, glycerin and water in varying proportions, and are non-irritating protectives to the skin. They require to be melted before use, and are then applied with a brush. The best known of them is Gelatum Zincum (see Zinc), but Ichthyol, Resorcin and many other drugs may be usefully combined with the gelatin basis in fashionable dermatological practice.

2. **Gelanthum** is Unna's latest jelly basis. Soak tragacanth 2½ drs. and gelatin 2 drs. in water 10 ozs. for 24 hours in a steam bath, press through muslin and add glycerin 5 drs. Heat the whole on a water-bath for 1 hour, and then add water in which ½ gr. of thymol is dissolved, to make up the product to 12 ozs. by weight.

3. **Mollins** (see p. 72) are prepared with superfatted soap.

PRIYA PARIJAT SEN.

SRI JAGADGURU VISHWARADHYA
JNANA SIMHASAN JNANAMANDIR
LIBRARY.
Jangamwadi Math, VARANASI,
Acc. No. 1029/2

2160

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PART III.

ADMINISTRATION OF DRUGS.

CHANNELS FOR ADMINISTRATION OF DRUGS.

Having gained a sufficient knowledge of the preparation of various official and non-official drugs, the student must direct his attention to the various routes or channels through which drugs enter the circulating fluid, and exert their influence on the whole or on a particular part of the body. The activity of a drug varies greatly with the form and the mode of administration. Thus, if it is a pill, it takes a longer time to act than if it is in solution. Again, a remedy subcutaneously injected produces its effects sooner than when administered by the mouth or rectum, or used as an inunction.

The following are the various channels through which drugs enter the system.

1. **The Digestive Tract** is the most important and the ordinarily selected route.

(*a*) *The Mouth.*—We administer drugs by the mouth for absorption by the gastric tract. For topical action, we use gargles, collutoires, pigments, pastils, lozenges; jujubes, dentifrices, &c.

(*b*) *The Pharynx* is reached by pigments, pastils, collutoires, sprays, insufflations, lozenges and jujubes.

(*c*) *The Stomach and Intestine.*—The stomach is the chief organ of absorption and after this the intestines. The absorption of a drug is influenced by (*a*) its *solubility*, and (*b*) the *conditions under which it is administered.* Thus, a pill takes a longer time to absorb than a mixture. Again, salines are more rapidly absorbed than metallic salts or alkaloids. A drug acts more rapidly on an empty stomach than a full one. Mixtures, draughts, pills, powders, boluses, emulsions, confections are administered by this route.

(*d*) *The Rectum.*—When medication by the stomach is impossible, we take advantage of this route by means of enemas and suppositories.

2. **The Respiratory Tract** is the next most important route.

(*a*) *The Nose.*—What the mouth is to the stomach, the nose is to the lungs. Inhalation is carried on by the nose and mouth. Collunaria, snuffs, bougies, pigments, insufflations are used here.

(*b*) *The Larynx* is reached by inhalations, insufflations and pigments.

(*c*) *The Lungs.*—Through this channel vapours or atomised drugs rapidly enter the system. The rapidity of absorption can be gauged from the production of chloroform anæsthesia.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

3. **The Skin.**—By the following methods, we can introduce medicaments into the body through the cutaneous surface :—

(*a*) *Enepidermic.*—In this method, drugs are simply kept in contact with the unbroken skin without friction or rubbing. Pastes, plasters, poultices, fomentations, pigments, cerates, creams, ointments, &c., are thus applied.

(*b*) *Epidermic or Iatroleptic.*—In this method, drugs are rubbed into the unbroken skin. As liniments, codliver oil inunction in scrofula.

(*c*) *Endermic.*—In this, the cuticle is first denuded to promote rapid absorption of drugs. This can be rapidly done by soaking a piece of blotting paper or some porous tissue with strong solution of ammonia, and applying it to the skin and immediately covering it with a watch glass or a piece of oiled silk. After a few minutes, a blister rises and the cuticle is removed, and the finely powdered drug is sprinkled over the raw surface. Morphine can be thus dusted over in ovarities, sciatica, &c.

(*d*) *Inoculation.*—In this, the epidermis is punctured or scarified for introduction of medicaments; as vaccination.

4 **The Subcutaneous Tissues.**—These are reached by hypodermic or subcutaneous injection which is effected by a small syringe to which is attached a hollow needle.

5. **The Deep Tissues.**—By the same instrument, we can administer drugs to deeper structures, such as the muscles and nerves. When the injection is given within the substance of a muscle, it is called *parenchymatous.* A familiar example is the intramuscular injection of corrosive sublimate in the treatment of syphilis.

6. **The Blood Vessels.**—Through these channels, blood, nutrient and saline fluids are introduced by the process of *transfusion.*

(*a*) *The Veins.*—The transfusion may be **immediate**, by directly introducing the flowing blood from a vein of an individual into that of a patient; and **mediate**, when warm defibrinated blood, a saline solution or milk is infused. Transfusion is very useful in post partum hæmorrhage, collapse of cholera, syncope, &c.

(*b*) *The Arteries.*—Arterial transfusion is rarely resorted to, though advocated by some authorities.

7. **The Serous Cavities.**—These are only used when the local action of the drug is required.

(*a*) *The Pleura.*—In empyema, we can wash out the pleural cavity by antiseptic lotions.

(*b*) *The Peritoneum.*—An injection of saline solution or milk has recently been advocated in severe hæmorrhage. The Peritoneum may be washed out by antiseptic fluids in some varieties of peritonitis.

(*c*) *The Tunica Vaginalis.*—Tincture or strong solution of iodine, liquefied carbolic acid or solution of corrosive sublimate is sometimes injected to produce an adhesive inflammation in hydrocele.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

8. **The Conjunctivæ and Lachrymal Ducts.**—Mydriatics, myotics, and drugs for local action in the conjunctivæ and lachrymal ducts are applied either as collyria, ointments, or powders.

9. **The Ear** is reached by injections, drops, insufflations, &c.

10. **The Bladder and Urethra** by injections and bougies.

11. **The Vagina and Uterus** by douches, injections, pigments, pessaries, medicated cottons, &c.

DOSAGE OR POSOLOGY.

Having selected a drug and the route through which it is intended to be administered, the student must next determine its dose. The word "dose," as ordinarily understood, means the quantity of a drug which is necessary to produce a certain pharmacological action either at once or after repetitions The study of these doses is called **posology.** By a **maximum dose,** we mean the largest quantity which may be given to an adult without producing evil effects, and by a **minimum dose,** the lowest quantity which is necessary to obtain a physiological action. The B.P. doses represent only average ordinary doses for an adult. The student must steadily bear in mind that the action of a drug varies with different doses. Thus, antimonium tart. is a diaphoretic in $\frac{1}{24}$ to $\frac{1}{8}$ gr. and an emetic in 1 to 2 grs.; zinci sulphas is a tonic in 1 to 3 grs. and an emetic in 10 to 30 grs.; Ipecacuanha radix is an expectorant in $\frac{1}{4}$ to 2 grs and an emetic in 15 to 30 grs. Though the B.P. posology is meant as a general guide, yet the practitioner can reduce the minimum and exceed the maximum limits of the pharmacopœial doses. For instance, the B.P. dose of Tr. aconite for repeated administration is 2 to 5 ms., we often give it in drop doses. Again, we daily exceed the official maximum doses of quinine salts, potassium iodide, bismuth salts, male fern, opium, &c.

In determining doses, the following circumstances should be taken into consideration :—

1. **Age.**—The dosage varies considerably with the age. By **adult dose,** we mean the dose for a person between 20 and 60 years of age. Children should get a fractional part of the adult dose. A practical method of calculating the children's doses under 12 years, is given by Young. *The rule is to divide the age in years, by the age in years plus 12; the resulting quotient is the proper fraction of an adult dose.* Thus :—

For a child of 1 year, the dose will be $\frac{1}{1+12}=\frac{1}{13}$ of an adult dose.

" 4 years " $\frac{4}{4+12}=\frac{1}{4}$ "

" 8 years " $\frac{8}{8+12}=\frac{2}{5}$ "

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

From 12 to 16 years, ½ to ⅔, and from 17 to 20, ⅔ to ⅘ are the proportions. Over 60 years, the dosage should again be diminished slightly. For hypodermic medication, the dose is one-half of what is given by the mouth, and for rectal medication, it is the normal dose plus one-fourth, except in the case of strychnine, which should be exhibited in smaller quantities than when given by the mouth (see Nux Vomica).

2. **Sex.**—Women, as a rule being more delicate than men, cannot bear full adult doses. The menstrual period should also be taken into consideration. For instance quinine, if given during the period, may cause alarming hæmorrhage.

3. **Size and Body weight.**—The quantity which is required to produce a certain physiological effect in a strong, healthy, and stout person of more than average size and weight, is certainly not necessary to produce the same action on a thin and weak individual.

4. **Temperament** has some influence on doses. A person with a sanguine or nervous temperament, requires smaller doses than one with a lymphatic one.

5. **Idiosyncrasy.**—Individual susceptibility to the action of a particular drug or drugs, has long been recognised. We often come across patients, who cannot take a grain of potassium iodide without coryza, though ordinarily, many can take it in 5 gr. doses without inconvenience. Quinine sulphate does not agree with many. Others again are readily salivated by quite small doses of mercury.

6. **Toleration and Habit.**—Certain drugs, for some reason or other which we cannot explain, fail to produce the same effects with the same dose, when continued for a lengthened period. This is what specially happens with opium. Its dose must be increased after a while, in order to get the full or the original effects of the drug. This gradual loss of activity is due to *toleration by custom*. Sometimes, the person taking it becomes so addicted to its use, that he actually craves for and indulges in it, to the detriment of his health. This craving for a particular drug is called a *habit*. Like opium-habit, persons may contract alcohol-habit and cocaine-habit. Tolerance is also established in the case of arsenic, as the arsenic-eaters of Styria. Zinc sulphate acts as an emetic in 20 grs., but patients can tolerate the same or even more, if the dose is slowly increased, as in some nervous diseases.

7. **Rate of Absorption and Excretion.**—The quicker the absorption, or the slower the excretion, the greater is the effect produced by a drug. Thus, morphine subcutaneously injected, requires a smaller dose to produce a definite action, within a definite period, than what is necessary if administered by the mouth or rectum. (See action of Curare).

8. **Mental Condition.**—A morbid inclination of the mind towards the action of a particular drug, increases the action of the same. Thus, if a patient can be convinced that he will sleep by a certain draught a small dose of a hypnotic may induce sleep.

9. **Fasting.**—A drug acts more powerfully on an empty stomach than on a full one. Thus, the same quantity of alcohol which would intoxicate a person, if taken on an empty stomach, can be ingested with impunity if taken during or after meals.

10. **Race.**—Europeans who are accustomed to the use of allopathic drugs, require larger doses than Indian villagers, who have never used them in their lives. For example, an Indian villager getting an attack

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of intermittent fever, can be cured by 10 to 15 grs. of quinine sulphate, while the same fever in a European would require at least four times the quantity.

11. **Disease.**—Many diseases considerably modify the dosage of medicines. Thus, opium is borne in surprisingly large doses in biliary and renal colic, and in severe inflammation of the peritoneum and intestine. Large doses of mercury are tolerated in syphilis, but in Bright's disease, both opium and mercury are ill-borne.

12. **Climate.**—It is a well known fact, that alcohol can be consumed in larger quantities in cold countries, than in hot climates.

13. **Season.**—Certain remedies no doubt affect the constitution more powerfully at certain seasons of the year, than at others. Thus, iodide of potassium acts more readily during the rainy months, than in the summer.

14. **Hours of the Day.**—Vital force is lowest at the early hours of the morning. Consequently, in debilitating diseases, stimulants are more necessary at this time than later on in the day.

15. **Time of Administration.**—It is useless to administer even a very large dose of chloral hydrate when the person is in active labor, it should be given at bedtime. Codliver oil should always be given after food; given at any other times, it may derange digestion. Iron and arsenic too should always be given on a full stomach.

16. **Preparations of a Drug.**—Alkaloids, glucosides, neutral principles, extracts, &c., are all prescribed in smaller doses, than the crude drugs from which they are prepared. Thus, for 5 grs. of quinine sulphate, we should have to prescribe about 200 grs. of cinchona bark, had we no such preparation as quinine.

17. **Accumulation.**—Ordinarily, a drug after introduction into the body is either slowly or rapidly excreted. But, if we continue to administer it very frequently for a sufficient length of time, *i.e.* so quickly that it cannot be fully eliminated, a time may come, when it will accumulate to such an extent, as to produce suddenly toxic symptoms. This is called the *cumulative action* of a drug. It may be caused by the following circumstances:—

(a) Rapid absorption and slow elimination of a drug.—This occurs in the case of lead and mercury, both of which are eliminated slowly and with difficulty by the kidneys.

(b) Sudden arrest of the excretion of a drug.—Digitalis and strychnine are cited as examples of this class. During a course of digitalis treatment, if no precaution is taken, symptoms of poisoning may suddenly develop, without any increase of the dose. These toxic symptoms are said to be due to the powerful contraction of the renal vessels, which suddenly retards the elimination of the drug.

(c) Sudden solution and absorption of a sparingly soluble drug, owing to some changes in the contents of the intestine (Hale White).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

GROUPING OF DOSES.

The following grouping of doses will be a useful adjunct to the study of posolgy.—

Group.	Doses.
Acids, inorganic diluted, all (except hydrobrom. 15 to 60 ms.)	5 to 20 ms.
,, vegetable crystallized (except tannic 2 to 5 grs.)	5 to 15 or 20 grs.
Aquæ, all (except laurocerasi ½ to 2 drs.)	1 to 2 ozs.
Confections, all	60 to 120 grs.
Decoctions, all	½ to 2 ozs.
Effervescent powders, all	60 to 120 grs.
Extracts alcoholic, non-poisonous	2 to 8 grs.
,, ,, poisonous	¼ to 1 gr.
,, **aqueous,** (except aloes barb. 1 to 4 grs., krameriæ 5 to 15 grs. and opii ¼ to 1 gr.) ...	2 to 8 grs.
Infusions, all (except digitalis 2 to 4 drs.) ...	½ to 1 or 2 ozs.
Liquors, containing arsenic and strychnine ...	2 to 8 ms.
,, containing morphine salts	10 to 60 ms.
,, vegetable concentrated (except sarsa co. 2 to 8 drs.)	½ to 1 dr.
,, containing iron	5 to 15 ms.
Mixtures, all	½ to 1 or 2 ozs.
Oils Volatile, all (except copaibæ, cubebæ 5 to 20 ms. ; santali 5 to 30 ms. ; terebinth. 2 to 10 ms. or 3 to 4 drs.)	½ to 3 ms.
Pills all (except ferri. 5 to 15 grs. ; phosphori 1 to 2 grs. ; plumbi c. opio. 2 to 4 grs. ; saponis co. 2 to 4 grs.)	4 to 8 grs.
Spirits simple, all (except æther 20 to 40 or 60 to 90 ms. ; juniper 20 to 60 ms.)	5 to 20 ms.
Spirits compound, all (except armoraciæ 1 to 2 drs.)	20 to 40 ms. or 60 to 90 ms.
Succi, all (except belladonnæ. 5 to 15 ms. and hyoscyam. ½ to 1 dr.)	1 to 2 drs.
Syrups, all (except cascar. arom., chloral, copeinæ, rhei, sennæ ½ to 2 drs.)	½ to 1 dr.
Tinctures, all (except Tr. iodi 2 to 5 ms.)	30 to 60 ms. or 5 to 15 ms.

INCOMPATIBILITY AND ANTAGONISM.

A prescription should not contain any ingredients, which can counteract one another either physically, chemically or physiologically, when mixed together. If they do so, they are known as **incompatibles.** An incompatibility therefore may be of the following kinds :—

I. **Physical.**—This is also known as *pharmaceutical*, and occurs when the ingredients are not soluble in water, so as to

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

produce a clear solution. As oils, insoluble powders, some spirits, resinous tinctures, some extracts, &c., when ordered in a mixture.

II **Chemical.**—Such drugs should not be prescribed as would chemically react on one another, unless such a reaction is desired. Chemical incompatibility can be classified under two heads :—

A. *Homogeneous.*—In this *no visible change of form*, such as the liberation of a gas or formation of a precipitate occurs, though color may be changed. Thus, acids and bases are chemically and physiologically incompatible with each other; *e.g.* lactic acid with lime water, diluted hydrochloric acid with aromatic spirit of ammonia. Again, if the resulting salt is soluble and poisonous, the chemical neutralization can not resist the toxic action, as hydrocyanic acid and alkalis, for KCN is as poisonous as HCN, although the alkaline carbonates are not incompatible with HCN.

B. *Heterogeneous.*—In this there is *a visible change of form, i.e.*, the production of a gas or a precipitate. CO_2 is the chief gas liberated in such a decomposition, sometimes H_2S. The precipitates or the insoluble compounds form the largest chemical incompatibles. This class can again be subdivided into :—

1. *Intentional.*—Seidlitz powder, black wash, yellow wash, sodii citro-tart. efferv., all effervescing mixtures, &c., are examples of this variety. Vegetable astringents with chalybeates, and lead salts with solutions of opium also come under this category.

2. *Avoidable.*—This form of chemical incompatibility is very difficult to master. A complete knowledge of chemistry and solubility of drugs can alone help the student out of this difficulty. The following rule would greatly minimise his errors :—"*A drug should never be ordered in combination with any of its tests or antidotes.*" Thus, carbonates should not be given with free acids (except HCN and H_2S) ; acid salts, basic salts, double citrates *e.g.* scale preparations of iron, halogens with solution of ammonia, &c.

Alkaloidal salts should not be prescribed with alkaline carbonates or hydroxides, *e.g.* liqr. strychnine with spt. ammon. aromat, or morphine acetate with sodium or potassium bicarbonates, &c. Pot. iodide and tannic acid also throw down alkaloidal precipitates, especially if the solution is concentrated (see p. 84). Many fatal accidents have taken place from swallowing the last dose of a mixture containing a poisonous alkaloidal precipitate. Although, to some extent, the alkaloidal incompatibility can be avoided by the addition of HCl and alcohol, yet it is a safer plan to follow the practical rule of Dr. W. G. Smith ;—"*All poisonous alkaloids should as far as possible be prescribed in simple solution, and not in too concentrated a state.*"*

Sometimes explosive combinations result from inattention to grave incompatibility. (see p. 109).

* This portion is copied from Dr. Smith's article in the *Practitioner*, Oct., Nov., and Dec. 1899.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

III. **Physiological.**—When the pharmacological action of a drug is antagonised by that of another, both drugs are *physiological incompatibles* or *antagonists*. It is presumed that this antagonism takes place either in the blood or in the tissues. We do not know any drug which can fully and completely counteract the action of another on all points, though instances are common where *partial antagonism* takes place. Thus, opium contracts the pupils and depresses the respiratory centre, belladonna dilates the pupils and stimulates the respiratory centre (see Opium and Belladonna); hence both of them are partially physiological incompatibles to each other. Digitalis counteracts the action of aconitine on the heart; and strychnine and brucine that of physostigmine bromides and chloral hydrate on the cord. The depressant action of aconitine on the heart is also neutralised by the stimulant action of atropine, daturine and hyoscyamine on the same organ. Pilocarpine increases, while atropine decreases, both salivation and perspiration.

EXPLOSIVE COMBINATIONS.

Certain drugs, such as chlorates, bichromates, iodates, nitrates, picrates, permanganates, oxide of silver, &c., are **rich in oxygen** or part with it very easily; while others, such as sulphur, sulphides, iodine, reduced iron, hypophosphites, organic powders, charcoal, camphor, iodide of iron, ammonia salts, essential oils, &c, are **easily oxidisable.** An admixture between any two of these classes is sure to result in an explosive combination. The following are a few typical examples.—

1. A few tablets of potassium chlorate kept in a pocket with a box of safety matches cause explosion.
2. Potassium chlorate with tannic acid, catechu, morphine hydrochloride or gallic acid mixed as a dry powder has been known to explode.
3. A mixture of Tr. Ferri Perchlorid., glycerin and potassium chlorate explodes when warm.
4. Calcium hypophosphite alone when triturated hard, sometimes causes explosion. Never heat it with glycerin.
5. Potassium permanganate should not be made into a pill with vegetable extracts or combined with glycerin. (see p. 90).
6. Oil of turpentine and sulphuric acid, and amber oil and nitric acid are sure to explode violently.
7. Oxide or nitrate of silver with creosote forms a compound which may take fire if it becomes warm.
8. Chromic acid with glycerin, ether, strong alcohol, or organic substances causes an explosive combination.
9. Chloral hydrate and spt. ammon. aromat. in a mixture liberate so much chloroform as to explode.
10. Bismuth subnitrate and sodium bicarbonate given in a mixture, liberate CO_2 to cause an explosion. (see p. 81).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

11. Tr. iodine and solution of ammonia should not be prescribed together, as iodide of nitrogen is formed, which causes explosion. (see p. 82).

12. Erythrol tetranitrate is very sensitive to percussion. A young chemist lost his life from explosion due to the rubbing of the tetranitrate with milk-sugar in a mortar.

13. Nitric acid should not be mixed with glycerin.

14. Chloride of lime triturated with sulphur causes explosion.

POISONOUS COMBINATIONS.

1. Potassium chlorate and potassium iodide in solution does not react in ordinary temperatures but in the body produce a poisonous product probably iodate of potassium.

2. Potassium chlorate given with Syr. Ferri iodide liberate free iodine in the stomach and causes severe gastric irritation.

3. Hydrocyanic acid dilute with metallic hydrates, carbonates, subnitrates or subchlorides form cyanides of metals which are more poisonous than the acid.

COMBINATION OF DRUGS.

One or two words with reference to the combinations of drugs will be of use to a prescriber, whose first aim ought to be to present his patient with an effective and rational prescription free from incompatibles. An admixture of 12 or 15 ill-understood and ill-chosen drugs, in the hope that either one or other of them may hit the right nail on the head, can no longer be tolerated in these days of rational therapeutics. The student is therefore strongly advised never to prescribe unless he is quite sure of the pharmacology of the drugs he is using. Simplicity in combination should be the rule, but it does not follow, that one drug only at a time is to be given in distilled water. An effective combination of judiciously selected medicines, is of the utmost value in the treatment of diseases. The following are the advantages claimed therefore for a good combination :—

1. *The efficacy of a drug can be greatly increased by combining it with different preparations of the same.* Thus, if we desire to obtain the full effects of cinchona, we can get them best by combining its extract, tincture, and infusion in one prescription. So also the full effects, of calumba by prescribing tincture and infusion at the same time.

2. *By a combination of various drugs, whose actions bear resemblance with one another, we can augment or intensify certain properties of a drug.* Thus, a mixture of salts of potassium, sodium, and lithium will produce more diuresis, or increase the alkalinity of urine more rapidly, than when given separately. If we

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

desire to increase the astringent action of kino, we should combine it with catechu, krameria and logwood.

3. *By a careful admixture of corrigens, we can correct unpleasant and undesirable properties of a drug.* Thus, ginger is added to Pulv. Rhei Co, Pulv. Jalap. Co., and Pulv. Scammmonii Co., to remove the griping properties of the potent drugs. Hyoscyamus and belladonna correct the griping caused by colocynth. Hydrobromic acid lessens the cinchonism of quinine, and sal volatile the iodism of iodides. Arsenic prevents a bromide rash, and atropine the unpleasant symptoms caused by the injection of morphine.

4. *By a combination of two or more drugs individually producing entirely different physiological effects, we can sometimes increase the potency of a remedy in a particular direction.* Thus, by combining mercury and iodide of potassium with digitalis and squill, we can increase the diuretic properties of the latter drugs. The action of magnesium sulphate is enhanced by the admixture of iron and sulphuric acid. Iron and digitalis in combination are more powerful cardiac tonics than when they are given uncombined.

5. *By regulating the doses of various medicines of a particular class, though differing in their modes of action, a better and more valuable remedy can be obtained.* Thus, by prescribing potassium bromide and morphine in combination, we can induce sleep more effectually than if they are given separately. A good and effectual purgative is obtained by mixing jalap with cream of tartar, as Pulv. Jalap. Co.

6. *By mixing such drugs as chemically decompose each other, we at times get better results from the resulting products.* Thus, by giving potassium or sodium carbonate with citric acid, we derive the benefit of carbonic acid gas and potassium or sodium citrate. When mercuric chloride and potassium iodide are combined in a mixture, iodide of mercury is formed, which is much stronger and more efficacious than the salt prepared by an elaborate process.

7. *By a combination of such substances as would assist the solubility or absorption of a drug, a more effective remedy can be obtained.* Thus, salicylic acid is almost insoluble in water, but it is rendered entirely soluble by the addition of borax, alkaline carbonates, hydroxides, &c. (see Acidum Salicylicum). The absorption by the skin of the alkaloids of belladonna is greatly facilitated if belladonna is combined with fat, glycerin, oil or chloroform. Oleic acid is combined with alkaloidal salts in ointments, because it is a solvent for the same.

8. *For preservation of certain substances, a combination becomes necessary.* Thus, alcohol is added to succi and liquid extracts and glycerin to animal ferments with a view to their preservation.

9. *A combination becomes essential when we want to divide a potent drug.* Thus, to divide strychnine (see p. 77), arsenic or atropine, we mix them with sugar of milk or any other inert powder.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ART OF PRESCRIBING

WEIGHTS AND MEASURES IN A PRESCRIPTION.

The weights, and measures of capacity and length, used in a prescription are those of the imperial system (see p. 13), though the scruple and the drachm are still permitted to exist under protest. Besides, certain signs indicating weights and measures of capacity are also common, which have not been officially recognised. They are :—

G. = Granum, 1 grain = $\frac{1}{7000}$ of a Troy ounce or $\frac{1}{437.5}$ of an Avoirdupois ounce.
℈. = Scrupulum, 1 scruple = 20 grains.
ʒ. = Drachma, 1 drachm = 3 scruples or 60 grains ; or $\frac{1}{8}$ of a *fluid* ounce, or 60 minims.
℥. = Uncia, 1 ounce = 1 Troy oz. (480 grs.) or 1 fl. oz. (480 minims) or 437·5 grains of water.
M. = Minimum, 1 minim = $\frac{1}{60}$ part of a drachm or the volume of ·91145 grains of water.
Gtt. = Gutta, 1 drop, supposed erroneously to represent 1 minim. (It varies so much in size that it should neither be used in dispensing nor as a measure for powerful drugs (see p. 77).
O. = Octarius, 1 pint = 20 fluid ounces, or 1¼ lbs. of water.
C. = Congius, 1 gallon = 8 pints or 10 lbs. of water.

ENGLISH DOMESTIC MEASURES.

A tea-spoonful = 1 fluid drachm ʒi or a little more.
A dessert-spoonful = 2 fluid drachms ʒii (about.)
A table-spoonful = 4 fl. drms. or ½ ounce ʒiv or ℥ss. (about.)
A wine-glassful = 2 fl. ounces ℥ii or more.
A gill = 4 fl. ozs. ℥iv or more.
A tea-cupful = 7 fl. ozs. or more.
A breakfast-cupful = 12 fl. ozs. or more.
A glassful = 12 fl. ozs. or more.
A tumblerful = 15 to 20 fl. ozs.

These are only average measurements, for no cups or spoons are of the same size.

INDIAN DOMESTIC MEASURES.

Measures of Capacity current in the Bengal Presidency.

A Half-kancha = $\frac{1}{8}$ chattack or $\frac{1}{12.8}$ seer = 2 fl. drachms (about).
A Kancha = $\frac{1}{4}$ ch. or $\frac{1}{10.24}$ seer = 4 fl. drm. or 218·75 grs. of dist. water.
A Half-chattack = $\frac{1}{8}$ poa. or $\frac{1}{20.5}$ seer = 1 fl. ounce (about).
A Chattack = $\frac{1}{4}$ poa. or $\frac{1}{10.25}$ seer = 2 fl. ,, (about).
A Poa = $\frac{1}{2}$ seer = 8 fl. ounces. (about).
A Half-seer = $\frac{1}{2}$ seer = 16 fl ounces. (about).
A Seer or 64 kancha or 16 chattacks = 32 fl. ounces (about).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

MEASURES OF CAPACITY CURRENT IN THE BOMBAY PRESIDENCY.

A Sundia-palliful	=	1 drm.
A Curd-palliful	=	5 tollas or 2 ounces.
A Swayapak palliful	=	10 tollas or 4 ,,
A Panchpatriful	=	8 or 12 ,,
A Lota or tambiaful	=	3 or 4 lbs.

ABBREVIATIONS OR CONTRACTIONS IN PRESCRIPTIONS.

Ambiguous nomenclature is a source of confusion and error, and must therefore be avoided in prescriptions. The following are a few examples of ambiguous nomenclature :—

Mag. Calc.	may mean	either	Mag. Ponderosa* or Mag. Levis.
,, Carb.	,,	,,	Mag. Carb. Ponderosa or Mag. Carb. Levis.
Bismuth.	,,	,,	Bismuth Carb., Bismuth Oxide, Bismuth Subnitras* or Bismuth Salicylas.
Aloes	,,	,,	Aloes Soc.* or Aloes Barb.
Æther Chloric	,,	,,	Ether Chloric (Duncan's) or Spt. Chloroformi B.P.*
Ferri Cit.	,,	,,	Ferri et Ammon. Citras,* or Ferri et Quininæ Citras.
Liq. Morph.	,,	,,	Liq. Morphin. Hydrochlorid., Liq. Morph. Acetat. or Liq. Morph. Tartrat.
Ext. Belladon.	,,	,,	Ext. Bellad. Alcohol., Ext. Bellad. Liq., or Ext. Bellad. Viride.*
Acid Hydroc.	,,	,,	Acid. Hydrocyanicum or Acid. Hydrochloricum.
Ext. Col.	,,	,,	Ext. Colchici or Ext. Colocynth.
Hyd. Chlor.	,,	,,	Hydrate Chloral, Hydrarg. Chloridum (calomel) or Hydrarg. Perchlorid. (corrosive sublimate).
Aquæ Menth.	,,	,,	Aquæ Menth. Pip.* or Aquæ Menth. Virid.
Liq. Plumbi †	,,	,,	Liq. Plumb. Subacetat. Fort. or Liqr. Plumb. Subacetat. dil.*

The following contractions of words are ordinarily seen in prescriptions :—

Contr.	*Name.*	*Meaning.*	*Contr.*	*Name.*	*Meaning.*
Aa.	Ana	Of each.	**Cap. Cpt.**	Capiat	Let the patient take.
Ad.	Adde	Add.			
Aq.	Aqua	Water.	**Colo.**	...	To strain.
Aut	...	Or	**Co. or Comp.**	Compositus	Compound.
C.	Cum	With.	**Div.**	Divide	Divide.

* In practice, preparations with * are dispensed when no reference can be made to the prescriber.

† This was the subject of a question in practical dispensing. It was intended for Goulard's lotion.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Contr.	*Name.*	*Meaning.*
Et.	...	And.
F.	Fac	Make.
Ft.	Fiat	Let it be made.
Gr.	Granum	A grain.
Gtt.	Gutta	A drop.
Haust.	Haustus	A draught.
H.	Hora	An hour.
In.	...	In or into.
Levis	...	Light.
M.	Massa	A mass.
M.	Misce	Mix.
M. or Min.	Minimum	A minim.
Mist.	Mistura	A mixture.
Mitte	...	Send.
Nox	...	Night.
Om.	Omnis	All, every.
R.	Recipe	Take.
Rept.	Repetatur	Let it be repeated.
Sine	...	Without.
Sig.	Signa	Mark.
Ss.	Semis	Half.
Stat.	Statim	Immediately.
Talis.	...	Such.
Vel	...	Or.
Ver.	Verus	Genuine.
Vesp.	Vesper	The evening.
Vetus	...	Old.
Vitellus	...	The yolk of an egg.

The following contractions of phrases are often used in prescriptions:—

Contraction.	*Phrase.*	*Meaning.*
Ad lib. ...	Ad libitum. ...	... At pleasure.
A. H. ...	Alternis Horis.	... Every other hour.
Aq. Bull. ...	Aquæ Bulliens.	... Boiling water.
,, Dest. ...	,, Destillata	... Distilled water.
,, Ferv. ...	,, Fervens.	... Hot water.
,, Font. ...	,, Fontalis.	... Spring water.
,, Pluv. ...	,, Pluvialis.	... Rain water.
Bis ind. ...	Bis indies ...	... Twice daily.
B.P. or Ph.B.	... Pharmacopœia Britannica.	British Pharmacopœia.
Coch. amp.	... Cochlear amplum.	... A table-spoonful.
,, mag.	... ,, magnum	... Do.
,, med.	... ,, medium.	... A dessert-spoonful.
,, min.	... ,, minimum.	... A small spoonful or a tea-spoonful.
,, parv.	... ,, parvum.	... A tea-spoonful.
C. Vinar. ...	... Cyathus Vinarius	... A wine-glass.
D. in p. æ or Div. in p. æq.	... Dividatur in partes æquales	... Let it be divided into equal parts.
F. A. O. ...	... Folio Argenti Obruantur.	Let it be rolled in silver leaf.
Ft. Haust.	... Fiat Haustus. ...	... Let a draught be made.
F.m. or Ft. Mist.	Fiat Mistura. ...	... Let a mixture be made.
Ft. Mas. in pil. xii div.	... Fiat Mass in pilulæ xii divide.	... Let a pill mass be made and divide into 12 pills.
H.d. ...	... Hora decubitus.	... At bed time.
H.S.S. ...	... Hora Somni Sumendum	... To be taken at bed time.
M.b. ...	... Misce Bene. ...	... Mix well.
M.D.U. ...	... More dicto utendum.	... To be used as directed.
M.P. ...	... Massa Pilularis.	... A pill mass.
Mic pan. ...	... Mica panis. ...	... Crumb of bread.
Ne tr. s. num.	... Ne tradas sine nummo.	... Do not deliver unless paid.
O.M. ...	... Omni mane. ...	... Every morning.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Contraction.	*Phrase.*	*Meaning.*
Omn. bih....	... Omni bihora. ...	... Every two hours.
O.n. ...	... Omni nocte. ...	... Every night.
P.R.N. ...	... Pro re nata. ...	... When required, occasionally.
Q.s.... ...	... Quantum sufficiat.	... Sufficient quantity.
Q.h. O.h. ...	... Quaque hora or Omni hora. ...	... Each or every hour.
S.S. ...	... Statim sumendum.	... Immediately to be taken.
T.d. ...	... Ter in die. ...	... Thrice daily.

PRESCRIPTION WRITING.

A prescription is **simple**, when it contains a basis and a vehicle or excipient with or without a corrective; and **complex**, when it contains several adjuvants and corrigents besides the basis. The construction of a model prescription must be in the following order :—

1. The **superscription**, which consists of the symbol Re, which originally symbolised the planet jupiter, but is now an abbreviation of *recipe = take thou.*
2. The **inscription** or the body of a prescription, containing the *basis*, the *adjuvant*, the *corrigent* and the *vehicle* or *excipient*.
3. The **Subscription** or the directions to the dispenser, such as *misce, fiat, mist, pilula, &c.*
4. The **Signature** (from *L. signetur*—let it labelled) or the directions to the patient. This is written either in English or in vernacular.
5. The **Prescriber's name or initial** and the **date**. These we put at the bottom. The patient's name should invariably be written at the top of *recipe*.

The following is an example of a model prescription :—

Patient's name. W. Thomas Esqr.

Superscription. ℞

Inscription.

Liqr.	Ammon. Acetat.	...	...	ʒii (*Basis*)
Pot?	Acetas ...	...	...	gr. x (*Adjuvant*)
Spt.	Æther. Nit.	...	...	m. xx (*Adjuvant*)
Syr.	Aromat.	...	...	ʒi (*Corrigent*)
Aq.	Destill....	...	...	ad. ʒi (*Vehicle*)

Subscription. M., ft. mist., Mitte talis vi. div. in p. æ.*

Signature. *Sig.* ½*th* part every 3 hours during fever.

Date, 20. I. 01. *Prescriber's name*, R. Ghosh.

It is customary to write prescriptions in Latin. But directions should, as a rule, be given in the language of the country. They should be legibly written and ambiguous nomenclature avoided. In case the B. P. limits of

* In India, paper or bottle graduation is generally used to mark the doses of a mixture. (see p. 76).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

doses are exceeded, the doses should be initialed. They must be revised, and if possible copies kept before they are handed over.

ELEGANT PRESCRIPTIONS.

Elegance in a prescription should always be aimed at, but it does not follow that the student should prescribe only fancy pills, capsules, tablets and cachets. These are good and useful, but they cannot supply the place of a mixture. The importance of giving a mixture in an inviting and palatable form cannot be overestimated. We have various flavouring agents. Aromatic syrup, syrups of orange, orange-flower, glucose, hemidesmus, lemon, virginian prune, tolu and ginger are the popular ones. During the hot months, mixtures containing syrups soon decompose, but glycerin and flavouring waters may be substituted for them. Spirit of chloroform, chloroform water and liquid extract of liquorice cover the taste of many bitter and saline mixtures. Syrup of yerba santa disguises fairly well the taste of quinine salts. Rose water, orange-flower water, cinnamon water and anise water are good flavouring vehicles either for mixtures or for lotions. Cinnamon water disguises the odor of castor oil. Syrup of roses and red-poppy are only used as colouring agents. Compound tinctures of lavender and cardamoms are used both for flavouring and for colouring purposes. Liniments or ointments can be perfumed by otto of roses, oil of neroli and lavender. Nauseous and bitter powders can be given in cachets, or pills which can be coated or gilded (see page 90—2).

DIRECTIONS TO THE PATIENT.

Make it a point to give directions in a definite manner. They should be short, simple and to the point. It is very important to *mention the hour of the day*, when medicines are to be administered. To the student this may appear confusing in the beginning, but the following hints will aid him in this direction :—

1. Mineral acids, as a rule, are given after meals, except in cases where we want to check the excessively acid secretion,—gastric juice.
2. When we want to neutralise the acid secretion, we give alkalis, such as sodium bicarbonate, &c., after food ; but before food, when the gastric secretion requires stimulation.
3. Gastric sedatives, such as acid hydrocyanic dilute, bismuth salts are best given on empty stomach, as we want their local action.
4. Pepsin, papain, taka-diastase, extract of malt, should be given immediately after or along with the meals.
5. Pancreatin or other pancreatic ferments should be given two hours after food, along with sodium bicarbonate, as they aid duodenal digestion.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

6. Codliver oil and its preparations should be administered after and not before food. If given before they spoil appetite.

7. All preparations of iron, specially the astringent varieties are to be administered after meals.

8. All stomachics and bitter tonics, such as calumba, chiretta, quassia, are given ½ to ½ hour before food.

9. Arsenic is always given after meals, except in few rare cases, where its local action on the stomach is desired.

10. Potassium permanganate is always given after food.

11. Castor oil should be given on an empty stomach in the early morning.

12. Cathartic pills containing aloes should be given after dinner, as they take about 12 hours to act.

13. Emmenagogues should be taken at least one week before menstruation.

14. All diaphoretics act well when the patient is kept warm, and diuretics when cool.

15. Hypnotics, as a rule, should be taken at least half an hour before going to bed; but sulphonal two or three hours before, as it dissolves slowly.

16. Morphine should be administered subcutaneously when the patient is in bed.

17. Bromides when given as a sedative, are to be administered after meals or at bed time.

PRESCRIPTIONS FOR CHILDREN.

Great tact and caution are required in prescribing for children. The hints given below will greatly help the student in this direction :—

1. The dosage must be in proportion to the age (see p. 104.)

2. The bulk of a mixture must be small, not exceed one or at the most two tea-spoonfuls.

3. Medicines must be made as palatable as possible. Children like either sweet or tasteless medicines. They refuse bitters. Euquinine may be used as a tasteless substitute for quinine salts. Quinine should not be dissolved in mineral acids, as its bitterness is intensified.

4. Infants do not refuse either castor oil or cod-liver oil, but older children often reject the former. Cod-liver oil with extract of malt is never refused.

5. Never order pills for children, give dry drugs in the form of powders mixed with honey, syrup, milk, sweetened water, malt extract or jam.

6. Suckling babes are best treated by giving medicaments to their mothers; but some medicines, such as copaiba, oil of turpentine, asafetida make the milk so nasty, that they refuse to draw it. By giving mercury and potassium iodide to mothers, infantile syphilis can be cured.

7. They can bear belladonna and hyoscyamus in fairly large doses.

8. Arsenic too is well borne, some choreic children can take very large doses without harm (see Arsenic).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

9. A tea-spoonful of castor oil to a newly born babe is not a big dose.

10. Goodeve's Red Mixture is a very useful carminative aperient. (see Rhubarb).

11. Children are **very susceptible to opium.*** Opium and its preparations should therefore be avoided in children's practice. If administered at all, they must be given in very minute doses and the effects watched. Even liniments and fomentations containing opium should be used with caution.

12. Plain dill or anise waters make good all-round general vehicles for children's mixtures.

13. For round worm, santonin must be given on an empty stomach in large doses, either suspended in castor oil or mixed with sugar at night, and, then followed by a dose of castor oil next morning. The writer gives it with calomel and sugar followed by oil.

14. Children tolerate calomel better than adults and are rarely salivated.

15. Expectorants are best given in the form of syrups, or mixed with a syrup.

16. To induce vomiting, ipecacuanha wine should be given in full tea-spoonful doses. Some children do not vomit at all.

---

* In some parts of India, infants are habituated to the use of opium. It is given with a view to keep them quiet while their mothers are at work. Many native wet-nurses secretly administer this drug to their wards. The writer has seen an infant only 14 months old, taking daily one grain of opium without any other evil effects than constipation.

PRIYA PARIJAT SEN.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PART IV.

PHARMACOLOGY.

GENERAL PHARMACOLOGY OF DRUGS.

By the action of a drug on the human organism, we mean an interaction between a drug and the blood and the tissues, whereby on the one hand, either the composition of the blood is modified, and the anatomical state and physiological activity of the various tissues is altered; or on the other hand, the composition of the drug itself is affected. Thus, potassium chlorate, amyl nitrite, phenazone, pyrogallic acid destroy red blood corpuscles. Pilocarpine increases the secretion of saliva, atropine checks it; sodium and potassium citrates are decomposed into carbonates in the blood.

Unfortunately, there is no law to guide the student in the determination of the pharmacology of a drug, but the following will to some extent aid him in its study :—

1. **An intimate relation exists between the chemical composition and constitution, and the physiological action of a drug,** as will be evident from the following :—

(*a*) *The intensity of action of a drug increases in proportion to its atomic weight*, but this is only possible in those compounds which are isomorphous, *i.e.*, which crystallize in the same form. Thus, magnesia, ferrous salts, manganous salts, nickel, cobalt, copper, zinc and cadmium agree in action, but differ in degree. The toxicity of cadmium is the greatest and that of magnesia the least.

(*b*) *The molecular arrangement in a compound sometimes determines the action of a drug, without reference to its molecular weight.* Thus isomerides have the same chemical composition and the same percentage of weight, but differ in properties, on account of their different molecular arrangements. Resorcin and pyrocatechin are isomers $C_6H_4(OH)_2$. The former is sweet, the latter is bitter.

(*c*) *It is possible to modify the physiological action of a drug by artificially modifying its chemical constitution.* Drs. Fraser, Crum Brown and others have shown that by introducing *a methyl radical* into the molecules of strychnine, brucine and thebaine, new compounds are formed, which instead of acting as convulsants, are paralysers of the peripheral terminations of the motor nerves.

(*d*) *The action of a drug is sometimes determined either by the base, the acid, or the salt; the action of acid and base being lost by union.* Thus, caustic soda and hydrochloric acid are powerfully caustic, but this property is lost when they unite to form two such inert substances as sodium chloride and water.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

The following table taken from Brunton will illustrate how bases and acids influence the action of medicines.

Different Acids.		Different Bases.	
Sodium Hydrate	*caustic.*	Sodium chloride	*neutral in action.*
,, Bicarbonate	*antacid.*	Potassium ,,	*muscular poison.*
,, Sulphate	*purgative.*	Zinc ,,	*caustic.*
,, Benzoate	*antilithic.*	Barium ,,	*muscular poison.*
,, Salicylate	*antipyretic.*	Silver ,,	*inert.*
,, Cyanide	*powerful poison.*	Iron ,,	*astringent, hæmatinic.*
		Mercuric ,,	*corrosive, antiseptic.*

A similarity of action is noticeable in some salts, which have different bases but the same acids; as bromides and iodides of different metals. All nitrites act similarly.

(*e*) *Many drugs maintain a uniformity of action in whichever form they are administered, because they liberate common elements when they are broken up in the organism.* Thus, all mercurial preparations cause salivation.

2. **The action of a drug is determined to a great extent by its affinity for certain class of tissues, or by its power of acting on certain organs and tissues.** This selective action is observed in the pharmacology of almost every drug. Thus, amyl nitrite and nitroglycerin dilate the blood-vessels, ergot contracts them; atropine, hyoscyamine, and cocaine dilate the pupils; physostigmine, pilocarpine and morphine contract them.

The variation of action may be caused by many other influences besides the selective affinity; such as the varying rate of solubility, rate of osmosis, rate of absorption, rate of excretion, and the interaction of various functions

The action of a drug may be either *direct* or *local*, or *indirect* or *remote*. It may also be either *primary* or *secondary*.

The direct or *local action* of a drug is what it exerts on a part or organ with which it comes directly in contact. Thus, caustic potash causes irritation and sloughing when applied to the skin, hence its *immediate local* action is irritant and caustic. Copaiba during elimination stimulates urinary cells and bronchial glands, hence its *remote local* action is diuretic and expectorant.

The indirect or *remote action* of a drug is what it exhibits after absorption, on different parts of the body through the nervous system. For example, apomorphine hypodermically injected causes vomiting by exciting the vomiting centre, and not by exciting the gastric nerves. This is shown by a simple experiment. After injecting the drug, if the vessels are so tied that it cannot circulate to the vomiting centre, no vomiting occurs; although it can reach the stomach. The immediate local action of aconite on the tongue is tingling and numbness, and its indirect or remote action on the heart, is the slowing of its force and tension, due to the stimulation of the vagal roots.

The primary action of a drug is what is produced by it in its

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

unaltered state ; *e. g.* the emetic action of tartar emetic, the stimulant action of alcohol, &c.

The secondary action is that caused by compounds formed in the body from the decomposition of a drug ; *e. g.* the conversion of rhubarb into chrysophanic acid in the body, and consequent cure of psoriasis during a course of rhubarb treatment.

CLASSIFICATION OF DRUGS ACCORDING TO THEIR PHARMACOLOGICAL ACTIONS AND THERAPEUTIC USES.

CLASS I.—DRUGS THAT ACT ON THE DIGESTIVE ORGANS.

A. Drugs that act on the tongue.—

1. Drugs that influence the sensory apparatus of the tongue.—Drugs that act on the sensory branches of the glosso-pharyngeal, lingual and chorda tympani, can be divided into the following groups :—

(*a*) *Acids* ; as vegetable and mineral acids, lemon, tamarind, vinegar, oxymel, &c.

(*b*) *Aromatics* ; as dill, anise, fennel, cardamoms, coriander, nutmeg, cinnamon, ginger, cloves, peppermint, rosemary, spearmint, &c.

(*c*) *Aromatic bitters* ; as chamomile flowers, cascarilla, orangepeel, gentian, cusparia, chiretta and serpentary.

(*d*) *Bitters* ; as aloes, calumba, cinchona and its alkaloids, nux-vomica, strychnine, quassia, salicin, nim-bark, &c.

(*e*) *Demulcents* ; as acacia, linseed, almonds, starch, honey, figs, eggs, olive and almond oils, syrup, ice, isafghul, &c.

(*f*) *Nauseants*, as asafetida and valerian.

(*g*) *Pungents or acrids* ; as capsicum, cubebs, mustard, black-pepper, horseradish, &c.

(*h*) *Spirituous substances* ; as alcohol in every form, chloroform and ether.

(*i*) *Sweets* ; as sugar, gluside, glycerin, honey, liquorice, manna, &c.

B. Drugs that act on the teeth and gums.—

1. **Dentifrices** (see p. 68).—Chalk is an excellent basis for a tooth-powder. Charcoal scratches the enamel. Dentifrices may be grouped under the following heads :—

(*a*) *Antiseptic* ; which may contain quinine, carbolic acid, borax or thymol. They prevent decomposition of food lodged either between the teeth or within a cavity.

(*b*) *Astringent* ; which may contain myrrh, rhatany, catechu, betel-nut, kino or alum. Alum injures the teeth when continued for any length of time. These check bleeding and harden spongy gums.

(*c*) *Alkaline* ; which may contain chalk, soda or magnesia. They act by neutralising acidity.

2. Local anodynes are used to relieve toothache, which is generally caused by exposure of the tooth-pulp from destruction

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of the dentine. Opium, cocaine, strong carbolic acid, arsenious acid, creosote, menthol, chloral c. camphor, &c., are introduced into the cavity of the tooth by means of a pledget of cotton wool, after the cavity has been cleaned. In the case of irritants and caustics, a second pledget should be introduced either alone or better soaked in a solution of gum mastiche in chloroform, to prevent them from touching the tongue and cheek.

C. Drugs that influence the secretion of the salivary glands.—Drugs that increase the flow of saliva are called **sialagogues.** Their action is dependent upon (1) the activity of the secreting cells, and (2) the rapidity of the flow of blood, so as to maintain a supply of material for secretion.

1. Drugs which increase the salivary secretion reflexly by exciting the periphery of afferent nerves.—These are sometimes called **reflex** sialagogues, and may again be subdivided into :—

(*a*) *Those which act by stimulating the gustatory and the glosso-pharyngeal nerves of the mouth.*—

All vegetable and mineral acids.	Æther. Chloroform.	Alcohol. Acid salts.	Acrids or Pungents.

(*b*) *Those that act by stimulating afferent filaments of the vagus in the stomach* ; as nauseants and emetics, *e.g.* ipecacuanha and antimony.

Besides the remedial agents, mental emotion, sight, smell, &c., may reflexly stimulate the secretion of saliva.

2. Drugs which increase the salivary secretion either by acting on the periphery of the secreting nerves or on the secreting cells.—These are sometimes called **specific** sialagogues.—

Jaborandi. Pilocarpine.	Iodine compounds. Muscarine.	Mercurials. Physostigmine.	Tobacco.

Many drugs, such as tobacco, mercury, potassium iodide, act both reflexly through the nerves of the mouth, and specifically through the glandular cells or nerves.

3. Antisialagogues or Antisialics are drugs which lessen the secretion of saliva. They may do this in the following ways :—

(*a*) *By allaying irritation of the mouth and thereby depressing the irritated terminal ends of the afferent nerves.* As potassium chlorate, borax, astringent gargles, &c., which, by curing stomatitis, check excessive flow of saliva.

(*b*) *By reducing the excitability of the reflex centres or efferent nerves.* As opium and morphine.

(*c*) *By reducing the vascularity of the glands.* As physostigmine in large doses.

(*d*) *By paralysing the periphery of the secreting nerves.* The action of atropine is most marked in this respect. It paralyses the secreting nerve chorda tympani, and not the secreting cells, for after the secretion has entirely stopped, stimulation of the sympathetic will induce a flow of saliva. Atropine cannot affect the vaso-dilator nerves.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Therapeutics.—The secretion of saliva is considerably lessened in fevers, Bright's disease, diabetes, belladonna and stramonium poisoning, &c., consequently dryness of the mouth and thirst are urgent symptoms To relieve thirst, we use *refrigerant* drinks. By *refrigerants* we mean substances that are used to allay thirst and produce a feeling of coolness; as acidulated and effervescing drinks, juices of fruits, sherbets, acid salts, acetates and tartrates. If thirst is due to a deficiency of water or excess of solubles, especially sugar, salines, &c., in the blood irritating the thirst centre, opium relieves it, when other remedies fail.

When the mucous membrane of the mouth is irritated and inflamed, as in irritant poisoning, we use *demulcents* or substances which soothe and protect the surface (see p. 67).

D. Drugs which act on the stomach.—The stomach is the chief organ of digestion. For thorough digestion, the following factors are essential, *viz.*,—(1) complete mastication, (2) due secretion of the gastric juice both in quantity and quality, (3) proper churning movements of the stomach, and (4) due absorption of the products of digestion. Now, it is our object in the following pages, to discuss how far remedial agents can influence or modify the above normal processes. We have already noticed drugs that affect the functions of the masticatory organs and the salivary secretion.

1. Drugs which influence the gastric secretion.—

(*a*) *Drugs which increase the secretion of the gastric juice* are called *stomachics*. They do so (1) reflexly by stimulating the nerves of the mouth; (2) by rendering the contents of the stomach alkaline, as potassium and sodium bicarbonates, sal volatile, &c., given before meals; and (3) by stimulating the nerve-filaments and dilating the blood-vessels of the stomach; as all aromatic, bitter, pungent and spirituous substances (see p. 121). We have therefore :—

Aromatic stomachics. *Bitter stomachics.*
Alkaline stomachics. *Spirituous stomachics.*

Therapeutics.—Stomachics are used in dyspepsia and in the convalescent stage of many acute diseases. Alkalis are largely employed in dyspepsia, before meals to increase the secretion of the gastric juice, and after meals to relieve heart-burn and acidity; sodium bicarbonate being usually given for this purpose.

(*b*). *Drugs which decrease the secretion of the gastric juice.*—It is a known fact, that when the circulation of blood in the stomach is less active, the secretion of the gastric juice is diminished. Acids taken before meals reduce this flow, though they increase that of the saliva. Lead, silver, and zinc salts in small doses, opium, tannic acid, and many vegetable astringents, as kino, catechu, cinnamon, &c., reduce vascularity and act as *gastric astringents*, and indirectly as *gastric sedatives* Most of the aromatic, bitter, pungent and spirituous stamachics, especially

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

alcohol, ether and chloroform, in large and repeated doses materially lessen the secretion.

Therapeutics.—Hydrochloric acid dilute is given before food to prevent acidity in dyspepsia.

(*c*) *Drugs that modify the composition of the gastric juice and the contents of the stomach.*—

We have considerable control over the composition of the gastric juice, and the gastric contents as shown below :—

(1) *Drugs that increase the acidity of the gastric contents* :—As hydrochloric acid dilute after food.

(2) *Drugs that neutralise the acidity.*—These may be either (*a*) *direct antacids*, as alkalis ; or (*b*) *remote antacids*, as acetate, citrate and tartrate of soda and potash, which become converted into carbonates in the blood.

(3) *Drugs that supply the deficiency of gastric ferments.*—As pepsin and papain, alone or in combination with dilute hydrochloric acid.

(4) *Drugs that prevent fermentation and decomposition of the gastric contents*:—For this purpose, we use *antiseptics*, though with temporary benefit. Large doses are injurious. They are:—

Boric acid.	Creosote	Iodoform.	Sulphurous anhydride.
Carbolic acid.	Carbon (dry).	Naphthol.	Sodium hyposulphite.
Bismuth salicylate.	Eucalyptus.	Salol.	Sodium sulphocarbolate.
Salicylic acid.	Charcoal.	Thymol.	

2. **Drugs that dilate the gastric vessels.**—The vascularity of the stomach increases on the least irritation, especially in the presence of food. All stomachics except alkalis, and diluted mineral acids dilate the blood vessels to a small degree, but there are many drugs which powerfully irritate the mucous membrane, and may therefore be called *gastric irritants*, as arsenic, iron, mercury, senega, squill, gamboge, digitalis, colchicum, veratrine, copaiba, guaiacum, &c.

3. **Drugs that contract the gastric vessels.**—Gastric astringents do this, but their use is more confined to the intestine than to the stomach.

4. **Drugs that influence the gastric nerves and muscles.**—

(*a*). *Drugs which increase the flow of the gastric as well as the churning movements of the stomach*, without producing those peculiar movements which cause emesis, are called *gastric stimulants*, or *gastric* or *stomachic tonics*. As mineral acids, strychnine, ether, volatile oils, &c.

Therapeutics.—Stomachic tonics are used in atonic dyspepsia, especially dilute nitro-hydrochloric acid with nux vomica and calumba.

(*b*). *Drugs which depress the gastric nerves and muscles.*—They may be either *direct* or *local*, and *indirect* or *remote* :—

(1) *Direct or local Gastric Sedatives.*—These drugs directly

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

soothe the irritable gastric nerve-filaments by their local action. They are :—

Ice.	Hot-water.	Belladonna.
Bismuth salts.	Opium.	Hyoscyamus.
Hydrocyanic acid dilute.	Morphine.	Stramonium.
Carbonic acid.		

(2) *Indirect or remote Gastric Sedatives* :—These remedies soothe gastric irritation by reflexly depressing the afferent nerves through the nerve-centres. (see *counter-irritants*). They are :—

Blisters.	Morphine.	} hypodermically.	Hydrocyanic acid dilute.
Fomentations.	Chloroform.		
Poultices.	Opium.		

Opium is very powerful in this respect. The last two are local as well as remote gastric sedatives.

There are a few gastric sedatives whose action is not yet known, such as cerium oxalate, ipecacuanha wine and tincture of iodine in drop doses.

(*c*). *Drugs that help the expulsion of gas from the stomach and bowels.*—These are called *carminatives* (*carmino*, I soothe). They appear to act (1) by exciting healthy and regular peristaltic movements of these organs, (2) by dilating either the cardiac or sometimes the pyloric sphincters, and (3) by stimulating the gastro-intestinal nerves and muscles. As a result of these actions, there is either *eructation* or a discharge of flatus by the anal aperture. They are :—

Aromatics (see p. 121).	Asafetida.	Valerian.
Aromatic bitters. (see p. 121).	Camphor.	Spirits.
Ammoniacum.	Pungents.	Volatile oils.

Of these, aromatics and spirituous substances are the most effective.

(*d*). *Emetics.*—Vomiting is a complex physiological phenomenon, to produce which several parts are brought into play. The chief of them is the vomiting centre in the medulla and the afferent stimuli brought from various sources. *Emetics* are drugs which produce vomiting. They are generally divided into *direct* and *indirect*. By the former, we mean those that act only when they are introduced into the stomach ; by the latter, those that act by stimulating the vomiting centre, after introduction into the blood. Such a classification is erroneous, as emetics cannot act when introduced into the stomach, except by reflexly stimulating the vomiting centre. Therefore, they should better be divided into *local or gastric*, and *remote or central*.

(1) *Local or Gastric Emetics.*—These are known to cause vomiting, as long as they keep up their action on the gastric nerves, and to stop it, as soon as they are evacuated, or carried into the general circulation. No depression follows from their use. They are :—

Zinc sulphate.	Ammon. carbonate.	Mustard.	Warm water (in
Alum.	Copper sulphate.	Common salt.	large draughts).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(2) *Remote or Central Emetics.*—These act by stimulating the vomiting centre, through the circulation after absorption. They take a longer time to act, and are accompanied by nausea, salivation, sweat, secretion of mucus from the air-passages and œsophagus, and depression. As apomorphine, ipecacuanha, tartar emetic, squill, senega, tylophora.

(3) *Gastro-Central Emetics.*—Drugs of this class act by stimulating the gastric nerves as well as the vomiting centre; as ipecacuanha and tartar emetic.

Therapeutics.—Emetics are indicated :—

(*a*) To remove foreign bodies impacted in the throat and œsophagus.

(*b*) To expel undigested substances and poisons.

(*c*) To lessen the rigidity of the cervix in labour.

(*d*) To expel gall stones and bile.

(*e*) To remove false membranes or excessive bronchial secretion.

(*f*) To aid the action of antiperiodics.

They are contra-indicated in hernia, aneurism, prolapse of the rectum and uterus, peritoneal and intestinal inflammation, and in cases where there is a tendency to hæmorrhage, atheroma of blood vessels or abortion.

(*e*) *Antiemetics* are drugs which stop vomiting either by acting locally on the stomach, or centrally on the vomiting centre. They may therefore be divided into :—

(1) *Direct or Gastric Antiemetics.*—These stop vomiting by their direct sedative action on the gastric nerves. They are :—

Alcohol (in small doses).	Carbolic acid.	Hot water.	Morphine.
Arsenious acid (in small doses).	Carbonic acid.	Hydrocyanic acid.	Opium.
Bismuth salts.	Chloroform.	Ipecacuanha wine. (in 1m. doses).	Silver nitrate.
Calomel (in small doses).	Cerium oxalate.	Ice.	Sulphocarbolate.
	Cocaine.	Iodine (Tr. in 1m. doses).	
	Creosote.		
	Ether.		

(2) *Remote or Central Antiemetics.*—These act by removing the irritation of other structures or organs, besides that of the stomach and the nerve-centres; vomiting caused by the passage of a calculus through the ureter or gall-duct, or strangulated hernia, is an example of reflex or central vomiting. They are :—

Opium.	Chloral hydrate.	Nitroglycerin.
Morphine.	Hydrocyanic acid dilute.	Amyl nitrite.
Bromide salts.	Alcohol (in small doses).	

Therapeutics.—Remove the cause. Ice, hydrocyanic acid dilute, ipecacuanha wine, bismuth salts, carbonic acid, &c., are ordinarily used, and are the best local antiemetics. For reflex vomiting, opium and morphine are reliable.

E. Drugs that act on the duodenum.—We have not so much control over this part of the digestive tract, as we have

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

over the stomach. The normal chyme slightly acid in reaction is subjected here to a further digestive process by the alkaline secretions from the liver, the pancreas, and the intestinal glands. Drugs which aid duodenal digestion can be divided into the following two groups :—

1. *Direct duodenal stimulants.*—By increasing the acidity of the chyme towards the end of the gastric digestion, by diluted hydrochloric, nitric, nitro-hydrochloric or phosphoric acids, we can aid or stimulate the alkaline secretions in the duodenum.

Alkalis given before meals increase the acid secretion in the stomach, and thereby stimulate duodenal digestion. Ether stimulates the pancreatic secretion and probably emulsifies fats and oils. Indirect cholagogues, such as calomel, increase the flow of bile already secreted, by acting as a duodenal purgative.

2. *Remote duodenal stimulants.*—Sialagogues, stomachics and purgatives, indirectly stimulate the duodenal digestion, by transmitting into the duodenum chyme having a greater acidity.

F. Drugs that act on the intestine.—In order to understand how remedies act on this part of the alimentary canal, the student must refresh his memory as regards the physiology of intestinal digestion. The chyme after transmission into the small intestine is further subjected to the digestive processes, and the chyle and other soluble constituents are absorbed by the lacteals and portal veins as the chyme is propelled downwards by the intestinal movements, known as **peristalsis**. Absorption is carried on by *osmosis* or diffusion, and excretion partly by osmosis and partly by the glands, which furnish the *succus entericus*. The excretion particularly of the watery portion is so profuse, that the effect of absorption is neutralised, and the contents of the small intestine and the duodenum remain liquid. In addition to this certain benign micro-organisms, whose normal habitat is the intestinal tract, play an important part in intestinal digestion. They may occasionally give rise to toxins and so produce symptoms of considerable gravity. The muscular coat is supplied by the vagus and splanchnics ; the former increases peristalsis, and the latter restrains or inhibits it, just as the vagus does with the heart. Although these nerves maintain a connection with the brain and spinal cord, yet independently of them, as is seen when the entire nerve-supply is cut off, automatic movements may continue, which are due to the ganglia in the intestinal coats.

Four classes of remedies are known to affect the intestinal functions, viz.,—(1) purgatives, (2) intestinal astringents, (3) gastro-intestinal irritants, and (4) antiseptics.

1. Drugs that increase the secretion and peristaltic movements.—These drugs cause evacuation from the intestine, and are known as **purgatives, aperients or evacuants.** They can be divided into the following groups according to the degree and the manner of their action :—

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*a*). *Laxatives.*—These produce soft motions with a slight increase of peristalsis. They are :—

Bran bread.	Figs,	Sulphur.
Bran biscuits.	Tamarinds,	Magnesia.
Fresh vegetables.	Prunes and	Castor oil.
Honey.	Stewed apples.	(in small doses).
Treacle.	Manna.	Almond oil.
Fruits, as—	Cassia.	Olive oil.

Besides those mentioned above, nux vomica, belladonna, hyoscyamus, stramonium, ergot, physostigma act as laxatives under certain conditions, but they are not ordinarily used as such. Opium and belladonna in very minute doses, (tincture m. 1) paralyse the inhibitory fibres of the splanchnics and increase peristalsis and thus act as purgatives.

(*b*). *Simple purgatives.*—These are somewhat stronger than laxatives. They increase both the secretion and the peristalsis though mildly. As aloes, senna, castor oil, fel bovinum, rhubarb and cascara sagrada in large doses, magnesia.

(*c*). *Drastic purgatives.*—These are sometimes called *cathartics.* They cause large fluid motions with considerable griping and mucous discharge. In large doses they violently irritate the bowels producing mucous diarrhœa, griping (due to irregular contractions), collapse and even hæmorrhage. Hyoscyamus, belladonna, Indian hemp and aromatics correct their griping properties. They are :—

Croton oil.	Gamboge.	Colocynth.
Elaterium.	Kaladana.	Podophyllum.
Scammony.	Turpeth.	Jalap.

Many drastic purgatives produce a free and copious secretion from the intestinal glands, thereby abstracting much serum from the blood. They are therefore called *hydragogues*; as Jalap, scammony, elaterium.

(*d*). *Saline purgatives.*—These cause liquid or watery motions by increasing the intestinal secretion and hindering its reabsorption. The fluid then accumulates in the bowels and by distending them excites gentle peristalsis, and so causes an easy painless motion. If concentrated solutions of salines are used, the secretion of fluid is excessive and these purgatives then act as hydragogues. They are largely used by persons suffering from the gouty diathesis. They are magnesium sulphate, pot. acid. tartrate, sod. tartrate, sodium sulphate, pot tartrate, sodium phosphate, sod. citro tartrate, purgative mineral waters, as Hunyadi Janos, Pullna, Friedrichshall, Carlsbad, &c.

(*e*). *Cholagogue purgatives.*—These purge either by stimulating the liver and increasing the biliary secretion, or by exciting the peristalsis of the duodenum and small intestine, and thus

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

hindering the re-absorption of the bile secreted. They produce greenish stools. They are :—

Calomel. Podophyllum. Grey powder. Rhubarb.
Blue pill. Euonymus. Aloes. Drastic purgatives (some).

Therapeutics.—Purgatives are used :—

(1) To remove fæcal accumulation.

(2) To drain serum from the blood in the case of cardiac, renal and hepatic dropsy.

(3) To lower the temperature in fevers.

(4) To lower the blood-pressure in apoplexy and cerebral congestion.

(5) To prevent straining in persons suffering from piles, aneurism or hernia.

(6) To expel bile and help the passage of biliary calculi.

(7) To remove from the blood certain excrementitious matters, such as urea, uric acid, &c..

2. Drugs that decrease the secretion and the peristaltic movements of the intestine.—These are called **intestinal astringents**, and may be subdivided according to their mode of actions under the following heads :—

(*a*) *Intestinal astringents that act by contracting the vessels.*—They are alum and lead salts, silver salts (in dilute solutions) and sulphuric acid dilute.

(*b*) *Intestinal astringents that act by coagulating albuminous tissues supporting the vessels.*—These are also called *intestinal constringents.*—They are :—

Ferric salts.	Bismuth salts.	Catechu,	Krameria,
Copper salts.	Tannic acid,	Cinnamon,	Eucalyptus gum,
Zinc „	and substances	Kino,	Hæmatoxyli.
Lead „	containing it, as		

(*c*) *Intestinal astringents that act by reducing the glandular secretion.*—They are lead, calcuim salts and opium.

(*d*) *Intestinal æstringents that act by diminishing the peristalsis.*—They are opium, stramonium, lead salts, belladonna, hyoscyamus, lime and bismuth salts (?).

Therapeutics.—Intestinal astringents are employed to check diarrhœa. If it is due to offending matters or impacted fæces, a laxative or a simple purgative, such as castor oil or Gregory's powder should be given.

3. Drugs that produce gastro-intestinal irritation.—These are known as **gastro-intestinal irritants.** Many irritant poisons are given in minute doses therapeutically, but if they are swallowed in large doses, a train of symptoms is produced which are known as toxic actions. Thus, if the irritant is caustic or corrosive, it causes burning and pain in the lips, mouth, pharynx and

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

œsophagus. These parts soon inflame and become red and swollen. On reaching the stomach, it sets up intense irritation, causing severe vomiting and retching, accompanied by severe abdominal pain and tenderness. As it is transmitted into the intestine, it causes the same irritation as in the stomach, accompanied by diarrhœa. The vomiting and purging may commence so suddenly that the symptoms may be mistaken for those of cholera. The vomit and stools often contain blood. General prostration, vascular depression and collapse are the chief general symptoms. If the patient survives for a few days, peritonitis, gastric or intestinal ulcers, or stricture of the œsophagus may follow; but if the patient dies soon after swallowing the poison, at the autopsy the mucous membrane of the stomach and intestines is found red, ecchymosed and swollen.

Certain irritant poisons, such as phosphorus give rise to secondary toxic symptoms some time after the cessation of the primary ones.

4. Intestinal antiseptics.—These are occasionally used to prevent fermentation of the intestinal contents, or absorption of septic matters. Many however doubt their efficacy. (See p. 124).

G. Drugs that act on the entozoa infesting the human alimentary canal.—

1. Anthelmintics are drugs which kill or expel the intestinal worms. They are of two kinds, **direct** and **indirect.**

a. **Direct anthelmintics** may again be subdivided into the following two groups :—

(1) *Vermifuges* (*vermis*, a worm, and *fugo*, to expel) are those drugs, which simply expel, or drive out worms without necessarily killing them ; as jalap, scammony, gamboge, &c.

(2) *Vermicides* (*vermis*, a worm, and *cædo*, to kill) are those drugs which kill intestinal entozoa. These drugs may again be subdivided according to their actions on the different varieties of entozoa. Thus we administer :—

(*a*) For round-worm (*Ascaris lumbricoides*), santonin.

(*b*) For thread-worm (*Oxyuris vermicularis*), rectal injections of a solution of common salt, strong infusion of quassia or calumba, solution of ferric salts, and decoction of aloes.

(*c*) For tape-worm (*Tænia solium* and *T. mediocanellata*), male fern, cusso, pomegranate root-bark, melon-pumpkin seeds, embelia, kamala, and areca nut.

(*d*) For duodenal worm (*Ankylostoma duodenale*), thymol.

β. **Indirect anthelmintics.**—These act by improving the general condition of the mucous membrane and lessening the secretion of mucus, which acts as a protecting medium for, and

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

encourages the growth of, worms. As iron salts, bitter tonics especially quassia and calumba

H. Drugs that act on the liver.—The functions of the liver are but imperfectly understood. In short, it is a doorkeeper to the circulation. However, it is known to perform the following specific actions, viz,—(1) the formation and secretion of bile; (2) the excretion of bile; (3) the conversion of carbohydrates and some portion of proteids into glycogen; (4) the storing of glycogen and its reconversion into sugar; (5) the destruction or storing up and the excretion of organic poisons formed in or introduced from without into and absorbed by the intestine, and (6) the production of urea and uric acid. In the present state of our knowledge we cannot influence all the above functions. Those that we can, are given below :—

1. Drugs that influence the secretion of bile.—Drugs which increase the flow of bile, are called *cholagogues*. They are either *direct* or *indirect*. *Hepatic stimulants*, properly speaking, are drugs which increase the functional activity of the liver, which includes no doubt the increased amount of bile formed and secreted.

(*a*) *Drugs which actually increase the secretion of bile* are called *direct cholagogues*. Sometimes they are erroneously called hepatic stimulants. They are :—

Podophyllum.	Nitric Acid. dil.	Ammon. chloride.
Euonymus.	Sodium salicylate.	Colchicum.
Iridin.	„ benzoate.	Colocynth.
Ipecacuanha.	„ phosphate.	Rhubarb.
Aloes.	„ sulphate.	Hydrastis.

Acid. nit-hydrochlor. dil. Mercuric chloride.

Antim. sulphurate.
Potass. sulphate.
Jalap.
Scammony.
Baptisin.
Dilute arsenious acid.

} Of these, sodium salicylate makes the bile watery. Podophyllum and iridin increase the solid ingredients of the bile.

(*b*) *Drugs that only increase the excretion of the already formed bile, by the increased peristaltic action of the lower part of the duodenum and the upper part of the jejunum.*—These cause the bile to be rapidly swept along the intestine without allowing time for its re-absorption. These drugs are called *indirect cholagogues*. As mercurials and many cathartics.

Therapeutics.—All cholagogues are purgatives (see p. 128), because the bile stimulates the peristaltic action of the bowels. In hepatic disorders, such as biliousness, jaundice, hepatic dyspepsia, cholagogues are very useful, especially if the direct and indirect ones are combined together.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*c*) *Drugs which lessen the quantity of the bile secreted* are called *anticholagogues or hepatic depressants.* As opium, morphine, codeine, lead acetate, magnesium sulphate, calomel, castor-oil, gamboge, &c. Therapeutically they are never used.

(*d*) *Drugs that are used to dissolve gall-stones* may be called *biliary lithontriptics.*—Our knowledge of this class of drugs is very slight. Sodium salicylate may do good by increasing the fluidity of bile. Durande's remedy (ether 3, oil of turpentine 2), olive oil. glycerin, soap, Carlsbad mineral water are said to dissolve, expel or reduce the size of the stone.

2. Drugs that influence the glycogenic function of the liver. They are :—

(*a*) *Glycogenic stimulants.*—As amyl nitrite, dilute nitro-hydrochloric acid and sodium bicarbonate.

(*b*) *Glycogenic depressants.*—As antimony, arsenic, phosphorus, opium, morphine and codeine.

3. Drugs that influence the formation of the urea in the liver.—It is believed that lactate of ammonia and amido acids *e.g.* leucin, a nitrogenous derivative, are converted into urea in the liver. It is also believed that phosphorus, arsenic, antimony, ammonium chloride and iron *increase* the quantity of urea excreted in the urine; but they are never used therapeutically for this purpose. On the other hand, opium, morphine, colchicum, alcohol and quinine are believed to *decrease* the quantity of urea excreted in the urine.

Class II.—Drugs that act on the Respiratory System.

There is an intimate relation between the respiratory organs and the external air, the blood, the circulation, the nervous system and the respiratory centre. A disturbance in any of them, at once reflects upon the respiratory mechanism. For example, if the air inhaled is of abnormal pressure and temperature, or is deficient in quality or quantity, the respiratory functions are interfered with. If the condition of the red blood corpuscles which are the oxygenating elements of the body is altered, the respiratory activity is at once affected. This is also the case, if the circulation and the functions of the afferent nerves of the respiratory and other organs are modified. The object, therefore, is to remove the cause of the respiratory difficulty, either by influencing the external air, by stimulating the respiratory centre, or by depressing the centre against afferent impressions. Hence, drugs acting on the respiratory apparatus may be arranged under the following heads.—

A. Drugs that are inhaled with the air.—Chloroform and ether are inhaled diluted with air to produce general anæs-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

thesia, but there are other groups of drugs which can be inhaled in the same manner to produce definite actions as given below.—

1. *Stimulant Inhalations.*—These increase the vascularity, muscular activity and secretion from the bronchial tubes. They are carbolic acid 20 grs., cajuput oil 20 ms., fir-wool oil 5 ms., creosote 30 ms., cubebs ½ oz. and Tr. benzoin co. ½ oz. The doses indicate the quantities to be added to a pint of water at temperature 140°F. Fir-wool oil should be triturated with mag. carb. levis 2½ grs. and water 1 dr., and added to ½ pint of warm and ½ pint of cold water.

2. *Irritant Inhalations.*—These cause irritation of the bronchial mucous membrane; as chlorine, bromine, iodine, powdered senega, sulphurous anhydride, ammonia, nitric acid fumes, tobacco, &c. They are never used therapeutically.

3. *Sedative Inhalations.*—These allay or soothe the irritation of the bronchial mucous membrane; as hydrocyanic acid dilute and conium. They are rarely employed.

4. *Antispasmodic Inhalations.*—These relieve bronchial spasm; as chloroform, ether, amyl nitrite, smoke of stramonium, nitre-paper, a mixture of nitre and chlorate of potash, lobelia, belladonna, &c.

5. *Antiseptic Inhalations.*—These disinfect and deodorize foul bronchial secretions; as eucalyptus oil, terebene, creosote, carbolic acid, iodoform, sulphurous anhydride, juniper oil, cubebs oil, pumiline and solution of benzoin.

B. Drugs that act on the nose.—

1. *Sternutatories* or *Errhines* are drugs which cause sneezing and increase the secretion of the nasal mucous membrane, when locally applied. They are, tobacco (snuff); capsicum, ginger, black peppper, &c.; ipecacuanha, quillaia, senega and white hellebore, in powder.

Therapeutics.—These are sometimes used (*a*) to expel foreign bodies from the air passages, (*b*) to remove headache, (*c*) to expel the fœtus in lingering labour, if there is no obstruction, and (*d*) to check hiccough. They are contra-indicated in cases, where there is a tendency to pulmonary or cerebral hæmorrhage, hernia, prolapse of the uterus and rectum, and in atheroma of the blood-vessels

2. *Nasal sedatives* are drugs which remove irritation of the nasal mucous membrane. They may be either *local*, as bismuth salts alone or with morphine, cocaine, &c., or *general*, as pulv. ipecac. co., aconite, &c.

Therapeutics.—Ordinary nasal catarrh often yields to nasal sedatives, but infectious coryza, due to hay fever or influenza, may require an antiseptic nasal douche, spray, insufflation or gargle.

3. *Nasal astringents* are drugs which check epistaxis and excessive secretion of mucus from the nasal mucous membrane, when locally applied. They are alum, tannic acid, hamamelis, ferri perchlorid., ice, &c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

4. *Drugs that act on the olfactory apparatus.*—

(*a*) *Drugs that stimulate the olfactory nerves.*—The pungent vapours of certain drugs, such as ammonia and acetic acid, stimulate the terminal ends of the olfactory nerve and reflexly stimulate the vaso-motor and cardiac centres.

(*b*) *Drugs that depress the terminal ends of the olfactory nerve.*—Drugs which possess very powerful odors, such as musk, asafetida and ethereal oils, first stimulate the olfactory terminations, and then after a while depress them, so that the smells cannot be perceived with the same degree of intensity. Anosmia can also be induced by such substances as cause acute and chronic alterations in the nasal mucous membrane, *e.g.*, potassium iodide, snuff (tobacco) and irritant inhalations. (See p. 133).

C. Drugs that influence the respiratory centre.—The chief respiratory centre is situated at the tip of the calamus scriptorius in the medulla, at a point called *nœud vital* by Flourens, the destruction of which stops breathing and causes death. The vagal centre almost coincides in position with this spot. Properly speaking, this point forms the centre of a circle, within which the respiratory impulses originate. The vagus is the chief nerve of respiration, containing both sensory and motor fibres, and it therefore plays a most important part in respiratory functions. The afferent filaments which abundantly supply the whole of the air passages and probably the lungs, constantly transmit impressions to the centre, and incessantly modify respiratory movements. Again, the muscles of the bronchi being supplied with efferent fibres of the vagus, are constantly affected by various afferent impressions, which may even arise in the air-tubes themselves. Besides the vagus, there are other nerves which also influence the expiratory and inspiratory movements. We infer that a drug acts directly upon the respiratory centre (1) if it very quickly produces its effect in respiration when it is injected into the carotid artery. (2) if its effects on respiration is not altered by section of the vagi.

1. *Drugs which directly increase the activity of the respiratory centre* are :—

Strychnine, Ammonia, Stramonium, Digitalis, Atropine, Apomorphine, Hyoscyamus, Emetine } briefly.

Of these, strychnine, atropine and ammonia are very powerful.

2. *Drugs which directly depress the activity of the respiratory centre* are :—

Opium.	Chloral.	Ipecacuanha.*	Gelsemine.
Codeine.	Alcohol.*	Ether.*	Saponine.*
Hydrocyanic acid.	Aconite.	Chloroform.*	Antimony
Conium.	Veratrine.	Caffeine.*	salts.*
Physostigmine.	Virg. Prune.	Quinine.*	Heroin.

Those with* excite slightly before depressing. Pysostigmine

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

is very powerful, but is never used therapeutically for this purpose. Opium, codeine, hydrocyanic acid dilute, conium and virginian prune are ordinarily used.

Therapeutics.—Direct stimulants to the respiratory centre are used to increase the force of the respiratory act and thus to overcome respiratory difficulty, as in bronchitis, pneumonia, phthisis, opium and chloral poisoning, &c. Direct sedatives to the respiratory centre, especially opium, codeine, hydrocyanic acid dilute are often prescribed to allay cough reflexly set up by the irritation of the lungs, stomach, liver, spleen, pleura, trachea, bronchi, larynx, nose, pharynx and œsophagus.

D. Drugs that influence the bronchi and the lungs.—

1. *Drugs that stimulate the afferent nerves* are the irritant inhalations (see p. 133), and ipecacuanha and antimony internally.

2. *Drugs that depress the afferent nerves* are the depressants of the respiratory centre (see p. 134).

3. *Drugs that affect the bronchial glands.—*

(*a*) *Drugs that increase the bronchial secretion* are :—

Alkalis (especially ammon. carb).	Squill.	Terebene.	Balsam of Peru.
	Ipecacuanha.	Turpentine.	Balsam of Tolu.
Iodine.	Benzoin.	Volatile oils.	Copaiba.
Quillaia.	Antimony salts.	Asafetida.	Onion.
Apomorphine.	Camphor.	Tobacco.	Garlic.
Senega.	Jaborandi.	Sulphur.	Urginea.

(*b*). *Drugs that diminish the bronchial secretion* are acids (powerful), belladonna, stramonium, hyoscyamus.

(*c*) *Drugs that disinfect the bronchial secretion* are the antiseptic inhalations, (see p. 133), and copaiba, cubebs, ammoniacum, volatile oils and oleo-resins internally.

(*d*) *Drugs that stimulate the nervo-muscular tissues of the bronchi* are those which excite the afferent nerves. (as drugs in D., No. 1).

(*e*) *Drugs that depress the nervo-muscular tissues of the bronchi and thereby relieve bronchial spasms* are called *bronchial antispasmodics*. These may be either (1) antispasmodic inhalations (see p. 133), (2) depressants to the respiratory centre (see p. 134), (3) expectorants (see p. 136), or the following :—

Stramonium.	Sodium nitrite.	Tobacco.	Cannabis Ind.
Lobelia.	Nitroglycerin.	Ether.	Adhatoda.
Belladonna.	Grindelia.	Chloroform.	Opium.
Amyl nitrite.	Hyoscyamus.	Chloral.	Ethyl iodide.
			Conium.

Therapeutics.—Respiratory spasms are instantly relieved by amyl nitrite, nitroglycerin and sodium nitrite, but they quickly

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

return. Narcotics, such as opium, cannabis Indica, chloral hydrate, being powerful respiratory depressants are objectionable, though they may relieve spasms. Potassium iodide, stramonium, lobelia, spirits of ether, chloroform, ammonia and grindelia are ordinarily used with success in asthma. Atropine hypodermically sometimes relieves when others fail. Smoking stramonium or nitre-papers, &c. affords only temporary relief. If dyspnœa is caused by dyspepsia, gout, constipation, &c., remove the cause.

(*f*) *Drugs that act on the bronchial circulation.*—All remedies which stimulate the general circulation, such as digitalis, squill, alcohol, ammonia, strychnine, aromatic oils, &c, *increase the circulation of the bronchi.* All cardiac and general vascular depressants, such as aconite, antimony, ipecacuanha, iodides, alkalis, *diminish the bronchial circulation.*

E. **Expectorants** are remedies which facilitate the expulsion of the sputum. According to their mode of action, they may be grouped under the following heads :—

1. *Antiphlogistic or depressant Expectorants* —These increase the secretion, by subduing inflammation of the bronchial mucous membrane ; as nauseants and emetics in small doses, *e.g.* ipecacuanha, tylophora, antimony, apomorphine, lobelia, potassium iodide.

2. *Stimulant Expectorants.*—They are of two kinds, *viz*,—(*a*) those that stimulate the secretion of the bronchial glands during elimination ; as (in D², 3., a. p. 135) ; and (*b*) those that stimulate the respiratory centre and strengthen the expulsive muscles ; as strychnine and atropine.

3. *Sedative Expectorants.*—These act by diminishing the irritability of the respiratory centre, or of the tracts of afferent impulses ; as opium, *e.g.* pil. ipecac. c. scilla, tr. camph. co., tr. opii ammon., pulv. ipecac. co., morphine, codeine, and chloral hydrate.

4. *Mechanical Expectorants.*—These forcibly expel the sputum during the act of vomiting ; as ipecacuanha, antimony and ammonium carbonate which also liquefy the secretion ; or zinc sulphate if they fail.

5. *Antispasmodic Expectorants.*—These act by relaxing bronchial spasms ; as bronchial antispasmodics (see p. 135).

6. *Saline Expectorants.*—These increase the fluidity and alkalinity of the sputum ; as alkalis and alkaline salts, especially potassium bicarbonate and ammonium chloride.

7. *Antiseptic Expectorants.*—Many substances such as tar, terebene, pine-oil, sulphur, iodine, aromatic oils, balsams, and oleo-resins, are excreted by the bronchial mucous membrane thus disinfecting and deodorising the mucus, the flow of which is increased.

8. *Reflex Expectorants.*—These promote expectoration by reflex action, through impressions produced in the mouth ; as potassium chlorate, gum acacia, sugar candy, sodium chloride (native crystal), when sucked.

F. **Anti-Expectorants** are drugs which diminish the amount of water of the sputum and thus dry up the secretion ; as acids, iron, atropine and opium.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Therapeutics.—The indications for the use of expectorants have been fully detailed above. The student must be careful how he prescribes narcotics which are very powerful depressants of the respiratory and other centres. Inhalations of warm moist air, warm poultices to the chest, warm liquid food, demulcent gargles (see p. 71) are very useful adjuncts. If the secretion is excessive, acids, iron, bracing fresh air are useful.

CLASS III.—DRUGS THAT INFLUENCE THE BLOOD.

A. Drugs that act on the liquor sanguinis or plasma.—The liquor sanguinis being the *medium of nutrition* as well as the *carrier of the products of metabolic processes*, any disturbance in its composition directly affects the nutrition and the vital activity of the tissues and organs. We can modify the constituents of the plasma either by food, drugs, transfusion or abstraction of blood.

1. *Drugs that increase the alkalinity of the plasma* are :—

Potassium salts. Lithium salts. Ammonium salts. Alkaline mineral
Sodium „ Calcium „ Magnesium „ waters.

Of these, the action of the potassium salts is rapid and powerful but not so lasting ; and that of the sodium salts slow and weak, but more permanent. With uric acid they form soluble urates, which are eliminated by the diuretic action of the alkalis.

2. *Drugs that decrease the alkalinity of the plasma* :—The liquor sanguinis is normally alkaline, and cannot be made acid, for acid plasma cannot maintain life. But we can diminish its alkalinity by acids, especially the organic acids, as benzoic acid.

3 *Drugs that modify the composition of the plasma by the abstraction of water and salts* :—Purgatives, diuretics and diaphoretics remove much serum and salts from the plasma and thus materially alter its composition. Transfusion (see p. 103) and venesection directly affect it.

Therapeutics.—Alkaline salts are largely employed in rheumatism, gout and lithiasis. Potassium citrate is ordinarily used in lithiasis, as it does not derange digestion. Purgatives, diuretics and diaphoretics indirectly help the absorption of effusions and dropsical swellings of all kinds, as well as the removal of poisons circulating in the blood, as in uræmia.

B. Drugs that influence the blood corpuscles.—

1. Drugs that act on the red blood corpuscles.— Healthy red blood corpuscles contain a uniform amount of hæmoglobin. Iron is its chief constituent. Drugs which improve the quantity and quality of hæmoglobin, when deficient are called *hæmatics* or *hæmatinics*. Of course, these actions refer to patho-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

logical conditions of the blood, for the amount of hæmoglobin in healthy blood, cannot be increased to any appreciable extent.

(*a*) *Direct hæmatics* are drugs which directly increase the amount of hæmoglobin as well as the number of red corpuscles. Iron and its various preparations are the most powerful. Next to them is arsenious acid. Potassium permanganate, phosphorus, salts of copper and potassium are doubtful in their action.

(*b*) *Indirect hæmatics* are those remedial agents which act by removing the cause of the anæmia. Thus, quinine and mercury by curing the original disease, indirectly remove the anæmia of malarial fevers and syphilis respectively. Cod-liver oil aids assimilation and removes blood dyscrasia, whilst fresh air, sunlight, nutritious food, out-door exercises improve digestive powers. In this way they indirectly act as hæmatinics.

(*c*) *Drugs that affect the red corpuscles generally.*—Certain drugs, such as arsenious acid, phosphorus, iodine, sulphur, oil of turpentine, hydrocyanic acid, reduce *oxyhæmoglobin*, and thus impair its oxygenating power, if given in lethal doses. Citrates, acetates and tartrates of the alkaline metals are converted into carbonates at the expense of the oxygen of the hæmoglobin. Alcohol and quinine bind oxygen so firmly to the hæmoglobin, that its oxygenating property is impaired. Carbonic acid, quinine and morphine are said to reduce the size of the red corpuscles and hydrocyanic acid and oxygen to increase it. Mercury in small doses increases their number. Nitrite of amyl, sodium nitrite, nitrous ether, phenazone, acetanilide, and phenacetin convert a portion of hæmoglobin into *methæmoglobin* in full doses. Pyrogallic acid and potassium chlorate destroy red corpuscles.

Therapeutics.—Both direct and indirect hæmatinics are employed in anæmia, but the rational method of treatment is to ascertain and remove the cause of the disease. Direct hæmatics are only to be given when the digestive functions and powers of assimilation are in working order.

2. Drugs that affect the white blood corpuscles.—

(*a*) *Drugs that arrest the migration of the white corpuscles.*—The white corpuscles are migratory in their habit. If an inflammation is set up by an irritant or disease, they wander through the capillary walls. Quinine, quinidine, cinchonidine, and other cinchona alkaloids arrest this migration. Quinine is also known to reduce their number, and veratrine kills them if applied outside the body.

(*b*) *Drugs that increase the production of white corpuscles* — Aromatics, chiefly camphor and myrrh increase their production, probably by stimulating their absorption from the intestinal canal. Pilocarpine also is said to increase their number.

C. Drugs that act generally on the blood.—There are

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

many drugs which cannot be grouped under any of the above heads, as their actions have not yet been thoroughly defined. Thus, cod-liver oil increases the solid constituents of the blood. Potassium iodide and calcium salts increase its coagulability. Mercurial salts in toxic doses reduce the solids, diminish the coagulability and increase the fluidity.

CLASS IV.—DRUGS THAT INFLUENCE THE HEART AND ITS MECHANISM.

The heart is a peculiarly constructed nervo-muscular organ, performing complex functions. It is capable of originating spontaneous rhythmical movements. The theory that these movements are due to the ganglia located in the heart is no longer believed, but evidence goes to prove that they *originate from the spontaneous impulses generated in the muscular fibres of the heart, and not in the nerves and ganglia.* Though the muscular fibres spontaneously contract, yet they can be normally controlled and regulated by the nerve centres. Two centres control the cardiac mechanism, *viz.*,—the **cardio-inhibitory** and the **accelerator.** Afferent impressions from various parts of the body, including the seat of mind and the heart are transmitted to the centres in the medulla, to be reflected to the heart. Two sets of nerves perform this function. The vagus which contains both afferent and efferent nerves not only carries the afferent impressions from the heart, lungs, &c., but inhibits the heart's action. The accelerator nerve arising from the accelerator centre, (no definite position is known) forms a part of the sympathetic, and augments the action of the heart.

When the physiology of the heart is so complicated, our knowledge of drugs acting on the heart, must necessarily be very imperfect.

A. Drugs that modify the action of the heart.—It is not easy to determine whether a drug acts on the muscular fibres, or on the nerve-filaments. Though the apex of the heart is supposed to be free from nerve-fibres, yet it is difficult to prove their complete absence. However, if a drug acts on the excised apex, it is concluded that it acts on the muscular fibres only. Before attempting to study drugs acting on this organ, it must be remembered that if we stimulate the vagal branches, or the vagal periphery in the heart, we either diminish the force or the number of the cardiac impulses or both; and if we stimulate the accelerator nerves, we produce opposite effects. The actions produced by paralysing are the reverse of stimulating the respective nerves.

It is therefore safe to classify drugs according to their mode of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

action on the cardiac functions, rather than on its muscles and nerves.

1. *Cardiac tonics* are remedies which *increase the contractile force* of the heart with or without affecting the pulse-rate. The cardiac tonics which *slow the pulse-rate* are digitalis, strophanthus, squill, suprarenal extract, convallaria majalis, erythrophlœum, barium salts, caffeine, saponine, veratrine, &c. Of these, the first five are generally used. In large doses they usually arrest the heart in systole. The cardiac tonics which *do not alter the pulse-rate* are camphor, physostigmine, and minute quantities of alkaline, copper and zinc salts.

Therapeutics.—Digitalis and strophanthus are used to strengthen the heart's action enfeebled by acute febrile or inflammatory diseases, cardiac dilatation and mitral insufficiency. They are injurious in fatty degeneration of the heart and aortic insufficiency.

2. *Cardiac stimulants* are drugs which *increase both the force and the number of the beats* of the heart. As brandy, whisky, rum, gin, chloroform, ether, sal volatile, strychnine, arsenious acid, musk, aromatic volatile oils, &c. Certain drugs, such as belladonna, stramonium, hyoscyamus, cocaine, duboisine, saponine, sparteine *only increase the cardiac beats.*

Therapeutics.—Many of the cardiac stimulants, such as anæsthetics, and alcoholic substances stimulate the heart reflexly through the nerve centres, as well as directly. They are employed to prevent a sudden failure of the heart's action from shock or syncope, due to injury, mental emotion, poisoning, febrile and other diseases. Indiscriminate use of antipyretics in fevers depresses the heart, but the timely use of alcohol, musk, and camphor may prevent their depressant effects.

3. *Cardiac depressants* are remedies which either *decrease the force* or the *number of the beats* of the heart, or both. Drugs which *diminish the contractile force and finally arrest the heart in diastole* are dilute acids, muscarine, apomorphine, pilocarpine; and chloral, saponine, salicylic acid, alkaline salts, double copper salts, double zinc salts in large doses. Drugs which *reduce both the force and the number of the beats* are aconite, hydrocyanic acid dilute, antimony salts, veratrine and ergot.

Therapeutics.—Aconite is chiefly used to reduce the volume and frequency of the pulse in inflammatory diseases. Salts of antimony are useful in acute inflammatory conditions of the air-passages and the lungs. Hydrocyanic acid dilute is an excellent remedy for the palpitation of the heart caused by dyspepsia.

B. Drugs that act on the cardio-inhibitory centre.—The action of drugs on the vagal centre can be better studied than that on the accelerator centre. If a drug, after administration to

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

an animal, is observed to produce an alteration of the heart-beat, and that alteration is removed either by cutting the vagi, or by exciting the periphery of the nerve, if only one is divided; we conclude that the alteration of the heart-beat is caused by the drug acting on the vagal centre.

1. *Drugs which increase the activity of the cardio-inhibitory centre and slow the pulse-rate* are :—

Aconite.	Chloroform.	Nicotine.	Veratrine.
Æther.	Convallaria	Squill.	
Alcohol.	Cocaine (in large	Staphisagra.	
Atropine.	doses).	Stramonium.	
Butyl-chloral.	Hydrocyanic acid.	Strophanthus.	
Chloral.	Hyoscyamine.	Suprarenal extract.	

2. *Drugs which diminish the activity of the cardio-inhibitory centre.*—Large doses of drugs mentioned in the foregoing list, as well as those which lower the blood-pressure, such as nitroglycerin, amyl nitrite, and cocaine depress this centre.

C. **Drugs that probably influence the accelerator centre.**—Our knowledge of this class of remedies is very imperfect. Because certain medicines still further increase the number of pulse-beats, after the vagi are cut, we suppose they act by stimulating the accelerator centre; as ammonia, caffeine, picrotoxin and delphinine. We know absolutely no drugs which can depress this centre.

Class V.—Drugs that influence the blood-vessels.

The arteries are elastic, nervo-muscular tubes, whose calibre constantly changes owing to a variety of influences, which are transmitted by the *vaso-constrictor* and *vaso-dilator nerves*, from the vaso-motor centre located in the medulla, and certain other subsidiary vaso-motor centres in the spinal cord. By the blood-pressure, we mean the pressure to which the walls of the arteries are subjected. The rise and fall of the blood-pressure depend upon the activity of the vaso-constrictor and the vaso-dilator nerves respectively. Besides the afferent influences affecting the blood-pressure, there are other circumstances, which greatly modify it. They are (1) the cardiac activity, (2) the total quantity of blood in circulation, and (3) the peripheral resistence.

We do not know how drugs act on the arterial system, whether by influencing the vaso-constrictor or the vaso-dilator nerves, probably both. But for practical purposes, they can be grouped under those that act *locally* on the blood-vessels, and those that act *through the nerve-centres*. When they act locally, it is impossible to state whether they act on the nerve-terminations or the muscular fibres.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

A. Drugs that act locally on the blood-vessels.—

1. *Immediate local vascular stimulants* are medicines which dilate arterioles when locally applied to them. They are :—

Alcohol.	Chlorine.	Horseradish.	Silver nitrate.
Ammonia.	Chrysarobin.	Iodine.	(strong)
Antim. tart.	Copper sulphate.	Ipecacuanha.	Warmth, as
Arsenious acid.	(strong)	Mercuric nitrate.	Fomentation,
Camphor.	Creosote.	Mineral acids.	Poultice, &c.
Cantharides.	Croton oil.	(strong)	Volatile oils.
Capsicum.	Chloroform.	Mustard.	Zinc chloride.
Carbolic acid.	Ether.	Mylabris.	(strong).
		Senega.	

Alcohol, ether and chloroform can only act in the above manner, when their evaporation is stopped. Stimulant, irritant and antispasmodic inhalations (see page 133) also dilate the arterioles of the air passages by their local action.

2. *Remote local vascular stimulants* are drugs which, when taken by the mouth, dilate arterioles by their remote local action on them. As amyl nitrite, nitroglycerin, sodium nitrite, spirit of nitrous ether, caffeine, erythrol tetranitrate, manitol hexanitrate and nicotine.

Therapeutics.—The uses of local vaso-dilators will be discussed when we consider drugs that act on the capillaries. Remote local vaso-dilators are indicated in cases where we want to dilate a certain vascular area, to relieve a peripheral resistence to the circulation ; as amyl nitrite in angina, spirit of nitrous ether and caffeine in dropsy and anasarca.

3. *Immediate local astringents, local hæmostatics or styptics* are drugs which contract vessels when locally applied to them. They can be grouped under the following heads according to their mode of action.—

(*a*) *Drugs or measures that act by contracting the muscular fibres in the wall of the vessels.* As cold produced by any means, *e.g.* the evaporation of ether, ethyl chloride, methyl chloride and chloroform, ice, &c., alum ; lead salts, silver salts diluted, sulphuric acid dilute ; acetanilide, phenazone and hamamelis ; iron, calcium, cadmium, strontium, nickel, cobalt and magnesium contracting slightly. Of these, cold, alum, lead salts, diluted silver nitrate, sulphuric acid, ferric chloride and ferrous sulphate are used therapeutically.

(*b*) *Drugs that act by coagulating the albuminous fluids in the tissues surrounding the vessels.* As alum, salts of silver, lead, bismuth, zinc and copper ; persalts of iron, tannic acid and substances containing it, *e.g.* kino, catechu, krameria, hæmatoxylum, galls, hamamelis, &c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

4. *Remote local astringents or remote hæmostatics* are medicines, which contract arterioles by acting locally on them, after introduction into the circulation. As ergot, caffeine (early effects), physostigmine and digitalis.

Therapeutics.—Styptics or local hæmostatics are used.—

1. To stop external hæmorrhages.
2. To check excessive discharges, as leucorrhœa.
3. To constrict relaxed vessels, as in pharyngitis.

Remote astringents are useful in internal hæmorrhages, *e. g.* ergot in hæmoptysis.

B. Drugs that act on the vaso-motor centres.—

1. *Drugs that dilate the vessels by acting on the vaso-motor centres.*—These are all *remote vaso-dilators* and are.—

Alcohol.	Chloroform.	Hydrocyanic acid.	Lobelia.	Tobacco.
Aconite.	Chloral.	Hyoscyamus.	Opium.	Tartar emetic.
Belladonna.	Ether.	Ipecacuanha.	Stramonium.	Veratrine.

2. *Drugs that contract the vessels by acting on the vaso-motor centres.* They are :—

Ergot (very powerful).	Strophanthus.	Strychnine.	Hamamelis.
Digitalis.	Squill.	Hydrastis.	Lead and ammonia.
	Physostigmine.	Cocaine.	salts (slightly).

Ergot, digitalis, physostigmine contract the arterioles also by their local action on them (see remote local astringents). Many drugs, such as alcohol, ether, chloroform, stramonium, hyoscyamus, hydrocyanic acid dilute and veratrine merely cause a transient contraction, followed by stimulation.

C. Drugs that act on the capillaries.—The capillary vessels are the connecting links between the arterioles and the minute veins and through these the final distribution of the blood to the tissues is effected. Therefore the capillary circulation is immensely important to the pharmacologist, as alteration in the calibre of the capillaries causes a corresponding rise or fall of blood pressure (see p. 141). We can influence limited areas of capillaries, particularly those of the skin, as shewn below :—

1. *Drugs that cause a local dilatation of the capillaries and the arterioles of the skin.*—Under this head, we shall describe many useful remedies ordinarily known as *irritants*. They produce greater or less degree of vascular stimulation of the part to which they are applied. They can be grouped under the following classes, according to the degree of vascular excitement they produce :—

(*a*) *Rubefacients* are drugs which cause redness of the skin when applied to it. All immediate local vascular stimulants (see p. 142) act as rubefacients in the first instance.

(*b*) *Vesicants* or *Epispastics* cause vesicles or blisters to form when applied to the skin ; *e. g.* cantharides, mylabris.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*c*) *Pustulants* are drugs which produce pustules when applied to the skin; *e. g.* croton oil and tartar emetic ointment.

(*d*) *Caustics* or *Escharotics*, are drugs which destroy the vitality of the part to which they are applied. They cause sloughing and inflammation of the surrounding area; *e. g.* caustic potash or soda, zinc chloride, mineral acids, silver nitrate, &c.

When any of the above irritants is applied to the skin, with a view to lessen or counteract any morbid process which may be active in some other part of the body, it is called a *counter-irritant*. Cantharides is commonly used for counter-irritation.

Therapeutics.—For direct topical action, immediate local irritants, such as iodine, carbolic acid, cantharides, &c., are applied to unhealthy sores and chronic sinuses to stimulate their healing. Escharotics are used to destroy lupoid, cancerous and other growths. Counter-irritatants are indicated as follows:—

(1) To subdue inflammation or to afford relief to the circulation of a part or organ in direct vascular connection with the skin, selected for the application of rubefacients or vesicants; *e.g.* the application of a blister in acute pneumonia, pleurisy, hepatitis, &c.

(2) To help absorption of subjacent or subcutaneous morbid growths or effusion in a reflex way through the vaso-motor and trophic centres in the brain and cord; *e.g.* the application of flying blisters in pleuritic effusion and synovitis, and of iodine in enlarged glands.

(3) To relieve pain arising from the passage of renal and biliary calculi, or from neuralgia, *e.g.* sciatica and facial neuralgia.

(4) To allay central nervous irritability, as in hysteria.

(5) To stimulate the central nervous system; as in syncope, narcotic poisoning and in the lethargic condition of many acute idiopathic and inflammatory fevers.

(6) To relieve muscular irritability, *e.g.* sinapisms in choleraic cramps and lumbago.

(7) To remove any morbid process from the seat of disease to the irritated surface; as the application of a mustard plaster to the great toe or foot when gout attacks important organs. When counter-tirritants act in this manner, they are called *revulsives* or *derivatives*.

2. *Drugs that contract the capillaries and the arterioles of the skin.*—All local vascular astringents do this (see p.p. 142).

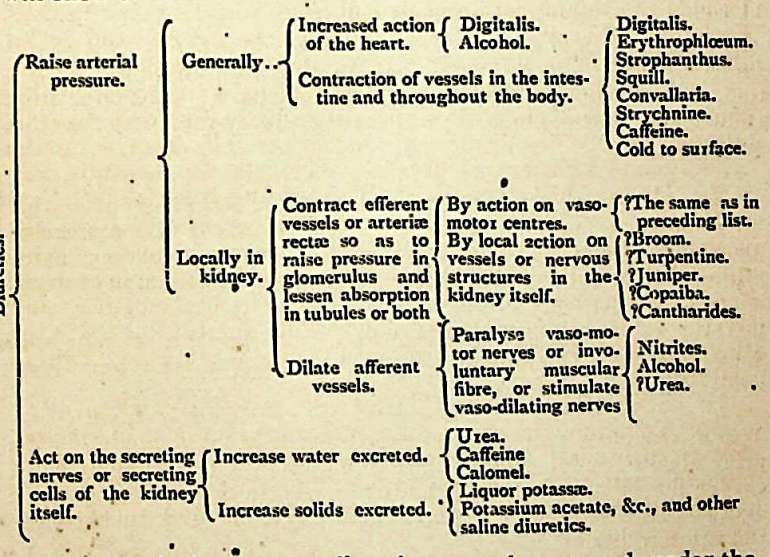
Class VI.—Drugs that act on the urinary apparatus.

A. Drugs that act on the kidneys.—The kidneys perform a twofold function. They (1) regulate the amount of water

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

in the system, and (2) remove the products of tissue-change, such as urea, uric acid, &c., which must remain in solution for excretion. The secretion of urine consists partly of filtration of water through the glomeruli, and partly of secretion by the cells of the tubuli uriniferi. The chief circumstances which modify the urinary secretion are (1) the arterial pressure and (2) the composition of the blood. By raising or lowering the renal or general blood-pressure, the secretion of urine can be increased or decreased as the case may be.

1. *Drugs that increase the amount of urine secreted* are called *diuretics*, and the effect thus produced is called *diuresis*. They act in various ways, as the following table taken from Brunton will shew :—



For practical purposes, diuretics may be grouped under the following heads :—

(*a*) *Stimulant diuretics.*—These act by stimulating the secreting cells of the kidney at the time of elimination. As gin, hock, cantharides, blatta orientalis, oleo-resins, resins and volatile oils, such as copaiba, cubebs, black pepper, turpentine, juniper, buchu, uva ursi, &c.

(*b*) *Refrigerant diuretics.*—These are little more than diluents, as plain or ærated waters, linseed tea, barley water, alkaline mineral waters, &c. Alkaline salts, especially those of potash, while passing through the urinary cells promote diuresis, they are therefore sometimes called *saline diuretics*.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*c*) *Hydragogue diuretics* act by raising the blood-pressure in the glomeruli; as digitalis, caffeine, squill, strophanthus, nitrous ether, adonis vernalis.

Therapeutics.—Diuretics are indicated to remove either water or solids from the body, and therefore we use them in :—

(1) Cardiac and pulmonary disorders, where the quantity of urine is diminished, or anasarca threatens.

(2) Renal diseases, to hasten the elimination of waste products or poisonous materials circulating in the blood. Diseases in which there has been accumulation of fluid in natural cavities, as pleurisy and ascites.

(3) Those cases where there is a tendency for the deposition of solids and the formation of calculi.

2. *Drugs that decrease the secretion of urine.*—We do not know any safe remedies which can do this. Cantharides, turpentine, phosphorus produce congestion of the kidneys, and thus reduce the flow. Therapeutically they are never used for this purpose.

B. Drugs that directly influence the urine.

1. *Drugs that contribute towards the acidity of the urine.*—Benzoic acid and benzoates are the only reliable remedies which render the alkaline urine acid. They are converted into hippuric acid in their passage through the kidneys. Salicylic, citric, and tartaric acids in large doses only feebly increase the acidity. Mineral acids have a negative effect, as they are excreted as neutral salts.

2. *Drugs that contribute towards the alkalinity of the urine.*—We have more powerful means at our disposal of rendering the urine alkaline. All potassium, sodium, lithium, and calcium salts, except the salts of ammonium are powerful in this respect. Nitric acid slightly increases the amount of ammonia and thus makes the urine feebly alkaline.

3. *Urinary lithontriptics or antilithics* are remedies employed for dissolving any concretions or calculi formed in the urinary tract, or for preventing the deposition of solids from the urine. Alkalis or piperazine should be given in uric acid and oxalate of lime calculi, and benzoates or benzoic acid in phosphatic ones. Potassium and lithium salts are valuable agents in converting uric acid into soluble urates as well as to alkalise the blood and urine of gouty patients. Copius draughts of water or diluents also prevent deposition by washing away the solids.

4. *Drugs that prevent the decomposition of the urine.*—Decomposition takes place either from (*a*) retention of the urine, as in stricture of the urethra or in impacted stone, or from (*b*) in-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

flammation of the pelvis of the kidney or bladder, thereby causing an admixture of purulent matter with the urine. Direct or remote antiseptics, such as boric, salicylic, and benzoic acids, uva ursi, cubebs, copaiba, sandal oil, urotropine and a few volatile oils render the urine aseptic.

5. *Drugs that alter the composition of the urine.*—They do this either by (*a*) their excretion in the original state in which they are administered, or by (*b*) the excretion of the products of their decomposition or by (*c*) the admixture of morbid products such as blood, pus, &c., produced by the remedial agents. They are too numerous to be detailed, only a few typical ones are given below :—

Saline diuretics increase the solids of the urine.

Santonin makes acid urine greenish-yellow or yellow, and alkaline urine reddish. Carbolic acid, creosote, naphthalene and other tar-preparations render the urine dark greenish-brown. Picric acid gives it a bright yellow color and methyl violet a dark blue. Rhubarb, senna and chrysarobin render acid urine brownish, and alkaline urine purplish-red. Log-wood makes alkaline urine violet.

All nitrites, acetanilide, potasium chlorate, pyrogallic acid, and occasionally large doses of arsenic and mineral acids render the urine dark-red, from the admixture of the debris of the broken up red corpuscles.

Cantharides, mylebris, turpentine and salicylic acid in large doses render the urine bloody. Phosphorus in large doses causes urea, leucin and tyrosin to appear. Turpentine imparts an odor of violets while cubebs and copaiba convey their characteristic smells.

Appearance of albumen in the urine is caused by cantharides, strychnine and digitalis.

Many poisons produce glycosuria ; Phloridzin or phloretin being the chief.

C. **Drugs that act on the bladder and the urethra.**—By correcting abnormalities in the urine, *e.g.* extra-acidity by alkalizers, and decomposition by urinary antiseptics, we can indirectly soothe the irritation of the bladder, but **urinary sedatives** such as opium, hyoscyamus, belladonna, stramonium, pariera, buchu, uva ursi, couch grass, cissampelos, hygrophila, &c., act directly upon the irritated mucous membrane. Of these, opium and hyoscyamus are the most powerful.

CLASS VII.—DRUGS THAT ACT ON THE CUTANEOUS SYSTEM.

The skin is the chief organ of perspiration and sensation. It also performs certain other specific functions, such as the regulation of heat (see Antipyretics), respiration, absorption, and the secretion of *sebum*. To the pharmacologist, perspiration is the most important.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

A. Drugs that act on the sweat-glands.—These glands are abundant all over the skin, but most numerous where hairs are absent, as the palms of the hands and soles of the feet. The sweat like the urine is an excretion and is regulated by nerves called *secreting nerves*, whose centres are in the medulla and the cord.

1. *Drugs that increase the secretion of the sweat*, but not to such an extent as would not evaporate, are called *diaphoretics*. If the perspiration is increased so much as to run down in streams, they are called *sudorifics*. They may act as follows :—

(*a*) *By directly stimulating the sweat-centres.*—This may be accomplished by (1) measures which *increase the venosity of the blood* such as narcotics—opium, chloral, chloroform, and alcohol, in later stage of their action ; (2) measures which *increase the temperature of the blood*, such as hot drinks ; and by (3) the following drugs :—

Dover's Powder. Ipecacuanha. Ammon. acetate. Nicotine ?
Camphor. Ammon. citrate. Antimony.

(*b*) *By stimulating the terminal ends of the nerves in the glands.*—Pilocarpine is most powerful in this respect. Dilatation of the cutaneous vessels by local warmth also aids diaphoresis. Nicotine and muscarine are said to act similarly.

(*c*) *By stimulating the secreting cells.*—It is difficult to say whether a drug acts on the gland-cells or on the periphery of nerves. Possibly ammonium acetate and citrate stimulate the cells and are eliminated along with the perspiration.

(*d*) *By dilating the cutaneous vessels.*—This is easily done by exciting vaso-motor nerves by means of local heat, such as hot fomentations, poultices, hot water or Turkish baths.

(*e*) *By increasing the blood-pressure by the ingestion of water or diluents.*

(*f*) *By reflexly stimulating the sweat-centres by afferent impulses, e.g.*, the impulses caused by nauseating medicines, hot spiced food and hot drinks.

(*g.*) *Diaphoretics, whose mode of action is unknown* are potassium acetate and citrate, arnica, aconite, colchicum, cubebs, salicin, serpentary, lobelia, and senega.

It is to be noted, that many of the diaphoretics act in more than one way. Thus, alcohol not only stimulates the sweat-centres, but dilates the cutaneous vessels and increases the flow of blood to the skin. There are others which excite the secretion, but at the same time diminish the cutaneous circulation. Diaphoretics have therefore been sometimes divided into *stimulant* and *sedative diaphoretics*. Antimony, ipecacuanha and pilocarpine are grouped as sedative diaphoretics, and the rest as stimulant ones.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Therapeutics.—Diaphoretics are indicated :—

(*a*) To reduce pyrexia.

(*b*) To cut short a threatening catarrh, or inflammation caused by specific poisons or metabolic products.

(*c*) To lessen the accumulation of fluid in the system, as in dropsy, and to relieve excretory organs, *e. g.* kidneys in albuminuria and intestines in diarrhœa.

(*d*) To eliminate excrementitious products through the skin when the action of the kidneys is suspended, as in uræmia. Pilocarpine is most useful for this purpose.

(*e*) To promote cutaneous circulation in many chronic skin diseases *e. g.* warm water or Turkish baths in psoriasis.

2. *Drugs that diminish the secretion of sweat are anhidrotics* or *antihydrotics*. They may act :—

(*a*) *By depressing the excitably, or removing the cause, of excitation from the sweat-centres*.—Measures which reduce the venous condition of the blood, indirectly help the reduction of perspiration. Thus cold sweats of exhausting diseases can be checked by ammonia, alcohol, strychnine, iron, fresh air and good nourishing food.

(*b*) *By depressing the activity of the efferent or secreting nerves*.—Opium in certain combinations with ipecacuanha as Dover's powder, or with sulphuric acid checks the night sweats of phthisis.

(*c*) *By depressing the activity of the terminal ends of the secreting nerves*.—The effect of atropine, extract of belladonna, stramonium, and hyoscyamine is very powerful in this respect. Measures which constringe cutaneous blood vessels, such as the application of cold, sponging with lotions containing sulphuric acid and tannic acid also check sweating.

(*d*) *By lessening the activity of the afferent nerves*.—Local cold applications, cool atmosphere, fanning, &c. do this.

(*e*) *Anhidrotics, whose mode of action is unknown*.—These are acids, quinine, nux vomica, picrotoxin, zinc oxide, salicylic acid and muscarine.

Therapeutics—Anhidrotics may be used to check either excessive general sweating, as the night sweats of phthisis, or the cold sweats of general debility, or local sweating as in hyperidrosis or bromidrosis of the hands or feet.

3. *Drugs that alter the composition of sweat*.—Certain drugs when taken internally are eliminated by the sweat. They are iodine, potassium iodide, tartaric acid, benzoic acid in the form of hippuric acid, and succinic acid.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

B. Drugs which soften and relax the parts to which they are applied are called **emollients or protectives.** By relaxing contractile tissues and dilating blood-vessels they relieve tension and pressure upon the nerves. They prevent cracking of the skin by supplying it with fat or moisture. As bland oily and fatty substances, glycerin, vaseline, lanoline, hot poultices, warm water, &c.

C. Drugs which protect mucous membranes from irritation are called demulcents. They are, glycerin, linseed, white of egg, ispaghul, gelatin, isinglass, honey, starch, &c.

D. Drugs that act on the capillaries and arterioles of the skin :—See pages 143-4.

E. Drugs that cause eruptions to appear on the skin :—They produce them possibly by irritatiug the skin during their elimination. A list of drugs and eruptions taken from Quain's Dictionary of Medicine, is given below :—

Diffuse or patchy erythema.—Antipyrine, arsenic, belladonna, benzoate of sodium, boric acid, bromides, chloralamide, chloral hydrate, chrysarobin, copaiba, salicylic acid, stramonium, tar.

Scarlatiniform erythema.—Belladonna, chloral hydrate, copaiba, iodoform, quinine, strychnine, bromide of nickel.

Papular or morbilliform erythema.—Antipyrine, arsenic, bromides, chloral hydrate, cubebs, morphine, quinine, terebene, turpentine.

Nodosum-like erythema.—Bromides and iodides.

Urticaria.—Antipyrine, arsenic, bromides, copaiba, iodides, morphine, quinine, resin, salicylic acid, salol, santonin.

Vesicles.—Cannabis Indica, chloral hydrate, cod-liver oil, copaiba, iodides, morphine, salicylic acid, quinine, turpentine.

Bullæ.—Bromides, cannabis Indica, chloral hydrate, copaiba, iodides, omrphine, phosphoric acid, quinine.

Pustules.—Arsenic, bromides (confluent), chloral hydrate, iodides (isolated), salicylic acid, antimony.

Purpura.—Chloral hydrate, chloroform inhalation, iodides, quinine, salicylic acid.

Pityriasis rubra (?).—Bichromate of potassium.

Psoriasis (?).—Borax, bichromate of potassium.

Eczema.—Bicarbonate of potassium, bromides, chrysarobin, iodoform.

Gangrene.—Arsenic, ergot, iodides, quinine.

Persistent desquamation.—Quinine.

Furuncles.—Arsenic, bromides, quinine.

Keratosis palmaris.—Arsenic.

Pigmentation.—Arsenic, nitrate of silver, picric acid.

Herpes zoster.—Arsenic.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

F. Drugs that influence the sensory apparatus of the skin.—These are the same drugs that act on the sensory nerve terminations. (see p.p. 155).

G. Drugs that affect the hair.—The hairs are epidermal growths contained in pits or *hair-follicles*. Their growth is dependent upon the nutritive supply and the nerve-power of the skin.

1. *Drugs that promote the growth of the hair.*—Measures which improve the nutrition of the hair-follicles by augmenting their blood-supply, especially immediate local vascular stimulants, promote growth of hair. They are liniments of ammonia, camphor, ammoniated camphor, turpentine, &c.; lotions (hair-washes) containing tincture of cantharides, spirit of rosemary, tincture of capsicum, ammonia, pilocarpine, &c.; iodine; mercurial ointments and oils of cade and winter green.

Therapeutics.—For baldness due to defective nutrition, *e.g.* after acute febrile attacks, stimulating hair-washes as mentioned above are useful. In obstinate cases, repeated blistering or the strong acid solution of pernitrate of mercury lightly brushed over is necessary. For syphilitic alopecia, mercurial ointments should be applied and constitutional treatment adopted.

2. *Depilatories.*—See page 68.

CLASS VIII.—DRUGS THAT INFLUENCE METABOLISM.

Metabolism is the sum total of chemical exchanges which occur in the tissues through the medium of the blood. The protoplasm of the tissues incorporates oxygen and other metabolic materials from the plasma and gives off carbonic acid, urea, water and other products of oxidation by the lungs, kidneys, skin and bowels. During this intake and output by the tissues, the protoplasm undergoes alterations or changes. In short, the tissues and the plasma are constantly acting and reacting upon each other, the *former altering the plasma and the latter the tissues.*

The metabolic process may be affected by various influences, such as.—

(1) Variations in the composition and the supply of blood.

(2) Variations in the supply of oxygen.

(3) Variations in the muscular activity.

(4) Variations in the activity of excretory organs.

(5) Variations of surrounding temperature, as of climate and baths.

(6) Variations in the activity of trophic centres.

(7) Medicinal agents.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

A. Drugs that increase the metabolic activity are called **metabolic stimulants or tonics.** They may be either **local or general.**

1. *Local metabolic stimulants*, are drugs which stimulate the nutritive process of a local area, *e.g.* the growth of hairs over a bald surface, or the removal of stiffness, swelling, and atrophy of muscles in chronic rheumatism. They act,—

(1) By increasing the vascularity of the part and thus carrying more nutritive materials to the tissues.

(2) By removing more rapidly the products of nutrition.

(3) By increaseing the protoplasmic activity of the tissues. All immediate local vascular stimulants (see list page 142) act as local metabolic stimulants.

Local metabolic stimulants are called *resolvents* when they cause absorption of inflammatory or other swellings.

2. *General metabolic stimulants* or *general tonics* are drugs which cause an increase in the strength and weight of the body, by stimulating the functional activity of the digestive organs as well as by improving the condition of blood. Therefore, by *tonics*, we mean remedies or measures which contribute toward the improvement of the tone of the body or any of its parts. If they promote appetite and digestion, they are called *gastric tonics*; if they enrich hæmoglobin and increase the number of red corpuscles, they are called *hæmatinic tonics* or *blood tonics*; if the imperfectly performed nervous functions are restored to a normal condition, they are called *nervine tonics*, and so on. Medicines during the metabolic process, become loosely incorporated with the cells, and form certain oxidation products which are thrown off; and in thus passing through an organ, they *modify the force which it displays.* The general tonics are :—

Iron.	Calcium chloride.	Caffeine.	Thyroid.
Mercury.	,, Hypophosph.	Guaiacum.	Water.
Arsenic.	Sod. Hypophosph.	Sarsa.	
Phosphorus.	Sulphurated lime.	Hemidesmus.	
Antimony.	Coca.	Mezereon.	

B. Drugs that diminish the metabolic activity are called **metabolic depressants.**—They act either by being themselves so readily oxidised that they rob the protoplasm of oxygen, or by making the oxyhæmoglobin a more stable compound, so that it cannot easily part with its oxygen. They are alcohol, quinine, phenazone, acetanilide, salicin, glycerin, resorcin, &c.

C. Alteratives are drugs which cure disease without producing any perceptible change in any of the organs. They appear to *alter morbid processes*, but in the present state of our knowledge, we cannot demonstrate how they act, perhaps by improving

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the metabolic process through their influence on trophic centres. The most important of this group are mercury, iodine, arsenic, gold, colchicum, &c.

CLASS IX.—DRUGS THAT ACT ON THE BODY-HEAT.

Drugs, except when given in toxic doses, have very little effect upon the temperature in health, but they act powerfully when it has been either depressed or raised above the normal. The maintenance of the body heat at about 98·4° F. is the result of a nice adjustment between heat production on the one hand and heat-dissipation on the other, and any thing which disturbs this equilibrium will cause either a rise or fall of temperature as the case may be.

A. **Antipyretics or Febrifuges** (*febris*, fever and *fugo*, to drive away) are remedies which lower the temperature of the body in pyrexia. They act in the following ways :—

1. *By diminishing the production of heat by affecting metabolism through the nerve-centres.* As phenacetin, phenazone, acetanilide, quinine, salicin, salicylic acid. Of these, the first three probably act on the cropus striatum. How the remaining act is not known, probably they lessen heat production by depressing the blood-pressure and metabolism.

2. *By dilating the cutaneous blood-vessels and thus augmenting radiation.*—As alcohol, antimony, aconite, opium, warm baths.

3. *By increasing the amount of perspiration* (see Diaphoretics) and thus causing a loss of heat by evaporation.

4. *By abstracting heat.*—Cold water, cold sherbets and ice may be swallowed for this purpose. Cold or tepid water bath, cold wet-pack, cold sponging, local irrigation with cold water, cold water compress, injection of cold water into the rectum and vagina, and evaporating lotions are agents, by which we can abstract heat from a local surface as well as that of the body.

5. *By neutralising or destroying any specific poison causing pyrexia* ; as quinine and arsenic in ague, and antidiphtheritic serum in diphtheria.

Therapeutics.—Antipyretics are used to reduce febrile temperature. Venesection, antimony, aconite, opium, &c., are now discarded. Phenazone, acetanilide, and sodium salicylate are not so much used now, because they produce at times dangerous symptoms. Phenacetin is far safer than any of the above, but is less powerful. Quinine and salicylic acid are useful antipyretics in malarial fevers and rheumatism respectively. Cold baths, cold sponging, application of ice or evaporating lotions are the safest procedures, and can be freely used. In fact the general rule should

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

be always to endeavour to reduce pyrexia either by actual abstraction of heat or by promoting heat-dissipation; and never to use drugs which lessen the production of heat except in cases of sudden emergency.

B. **Caloricrescents** are remedies which elevate the body-heat. They may be **local**, as fomentations, poultices, rubefacients (see p. 143) or **general**, as belladonna, caffeine, cocaine, and picrotoxin in toxic doses. Certain animal poisons as that of shell fish, tuberculin and albumoses also cause a rise of temperature. β-tetrahydronaphthylamine may increase the temperature many degrees. How these remedies act is not known. Therapeutically they are never used.

Class X.—Drugs that act on the Muscular System.

Elaborate experiments were made to determine the action of drugs on the muscles. Our scope does not permit us to go over them, we therefore give a summary of results as classified by Brunton, based on the classification of Kobert.

Group I.—"*Leaves the irritability of the muscle unaffected, but diminishes the total amount of work it is able to do.*" As apomorphine, asclepiadine, delphine, saponine, copper, zinc and cadmium. Antimony, arsenic, iron and platinum in large doses.

Group II.—"*Diminish the excitability of the muscle as well as its capacity for work.*" As potassium, lithium, ammonium, quinine, chloroform, chloral and alcohol.

Group III.—"*Diminish the capacity for work, and produce marked irregularity in its excitability.*" As lead, emetine and cocaine.

Group IV.—"*Alter the form of the muscular curve.*" As veratrine, salts of barium, strontium, and calcium, digitalis, squill and oleander.

Group V.—"*Increase the excitability.*" As physostigmine.

Group VI.—"*Increase the capacity for work.*" As theobromine and caffeine.

Class XI.—Drugs that act on the Nervous System.

By the nervous system, we mean the brain, the bulb, the cord, the nerves both sensory and motor and the various ganglia. The highest motor and sensory centres as well as those of volition, intellect, emotion, &c., are contained in the cerebral convolutions, while the simple automatic and reflex centres are in the basal ganglia, cerebellum, medulla and cord. All nerve-centres are connected with one another by nerve-filaments called *collaterals*, for co-ordination of impulses, and constitute the **central nervous system**. The ganglionic system though associated with the central nervous system is chiefly automatic in its action, and is known as the **sympathetic system**. The cerebral or highest centres are not only ex-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

citable or capable of being brought into action by afferent impulses, but possess an inherent power of spontaneously originating impulses themselves. Their action is therefore both **reflective and spontaneous.** To the pharmacologist this **reflective or reflex action** is very important. It is effected by (1) an afferent sensory nerve, (2) refex centre, and (3) an efferent, motor or secretory nerve. An afferent impression excited by an irritant on the skin or other structures of the body, is conducted by an afferent nerve to a system of nerve-cells known as the *reflex centre*, where it produces a certain protoplasmic disturbance, resulting ih a force, which either remains there as potential energy, or is conveyed by a different tract—efferent nerve—to perform some specific action either in the muscles, visceræ or the blood-vessels. Medicines can affect only some of the functions of the nervous system as shewn below :—

A. Drugs that act on the periphery of the sensory nerves.—These refer only to common sensory nerves and not those of the special senses. The action of a drug on the tactile sensibility is ascertained by observing, whether it produces after application a diminution of pain if present, or a loss of sensibility, or an increase of sensibility or pain.

1. *Drugs that depress the periphery of the sensory nerves.*—These may be either *local anodynes* or *local analgesics*, or *local anæsthetics.*

(*a*) *Local anodynes.*—These can act only when pain is present. They relieve pain by either directly paralysing the terminal ends, or by depressing the nerve-centre as well as the periphery. They are :—

Aconite.	Acid. hydrocyan.	Opium.
Belladonna.	dilute.	Stramonium.
Veratrine.	Creosote.	Hyoscyamus.
Carbolic acid.	Alcohol.	Aromatic oils.
Chloral.	Ether.	Zinc oxide.
Menthol.	Chloroform.	Sodium bicarb.

Therapeutics.—In most of the neuralgias, aconite, belladonna, chloral c. camphor, menthol, spray of ether and alcohol, application of aromatic volatile oils are of special service. Morphine hypodermically or endermically removes superficial and deeper pains. Pruritus is relieved by lotions containing carbolic acid, diluted hydrocyanic acid, and sodium bicarbonate.

(*b*) *Local anæsthetics.*—These lessen the tactile sensibility of a surface to which they are applied. In fact they are also *lacal anodynes.* They are carbolic acid, eucaine, kava, cocaine injected hypodermically; ether, ethyl chloride, methyl chloride when sprayed, and extreme cold.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. *Drugs that stimulate the periphery of the sensory nerves.*—When the blood-supply of a part is increased by immediate local vascular stimulants (see p. 142), the terminal ends of sensory nerves become irritated, giving rise to tenderness and pain (peripheral neuritis).

Therapeutics.—By stimulating the periphery of the sensory nerves by sinapisms, electricity, extreme heat or cold or local vascular irritants, we can reflexly stimulate the heart and lungs, and can rouse patients from unconsciousness, as that of syncope, opium poisoning, &c. (see counter-irritants p. 144).

B. Drugs that act on the periphery of the motor nerves.—The action of this group of drugs is best exemplified by *urara* a South American arrow-poison which directly paralyses the motor end-plates.

1. *Drugs that paralyse the periphery of the motor nerves in muscles.*—They are *local motor paralysers* and are :—

Alstonia	Hydrocyanic acid dil.	Methyl codeine.	Sparteine.
Amyl nitrite.	Hyoscyamus.	„ nicotine.	Stramonium.
Atropine.	Lobeline.	„ quinine.	Galvanism.
Camphor.	Methyl brucine.	„ strychnine.	
Cocaine.	„ cinchonine.	Nicotine.	
Conium.	„ morphine.	Saponine.	

Therapeutics.—Of these, belladonna, conium and cocaine are used therapeutically to paralyse, or at least to overcome the spasmodic contraction of, the sphincter ani. in rectal fissures and ulcers. They also depress the sensory terminal ends.

2. *Drugs that stimulate the periphery of the motor nerves in muscles.*—They are *local motor stimulants* and are :—

Aconite.	Nicotine.	Strychnine.	Electricity
Pilocarpine.	Pyridine.	(slightly).	(faradic).

C. Drugs that act on the nerve-trunks.—The trunks of nerves are less affected than the periphery.

1. *Drugs that affect the motor terminal ends and twigs.*—Lead, mercury, arsenic and alcohol, when continued for a long period, produce inflammation, fatty degeneration and other changes in the terminal ends and twigs of the sensory, and motor fibres, especially those of the latter, causing tingling and pain, and later on paralysis of motion and to some extent that of sensation.

2. *Drugs that affect the sensory nerve-trunks.*—Opium is most powerful in this respect. It can arrest the conduction of afferent impulses either at the periphery, the trunk or the sensorium (see p. 159).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

D. Drugs that influence the spinal cord.—The cord performs three specific functions, *viz.*—(1) the conduction of (*a*) sensory or afferent, and (*b*) of motor or efferent impressions, (2) the reflex action, and (3) the origination of impulses by special nerve-centres, as the sweat-centres, located in the cord. We do not know much of drugs acting on these normal processes, except what is given below :—

1. Spinal stimulants.—These drugs *increase the irritability of the anterior cornua and produce convulsions.* They are.—

Strychnine.	Thebaine.	Chloroform.	Ergot.
Brucine.	Ammonia.	Ether.	Opium.

Of these, strychnine is the most powerful, which in small and moderate doses intensifies the reflex excitability, and in large doses produces tetanus. Opium first stimulates and then depresses.

Therapeutics.—Strychnine is largely employed in motor paralysis local or general, after the inflammatory stage is passed.

2 Spinal depressants.—These *depress or paralyse the activity of the anterior cornua.* They may be either *direct* or *indirect paralysers.*

(*a*) *Drugs which directly depress the reflex movements* are :—

Chloral hydrate.*	Apomorphine.*	Amyl nitrite.	Lithium.
Bromides.	Veratrine.*	Sodium nitrite.	Silver.
Physostigmine.	Emetine	Camphor.*	Arsenic.*
Chloroform.*	Alcohol.*	Mercury.	Carbolic acid.*
Opium.*	Ergot.	Antimony.	Zinc.
Ether.*	Gelsemium.	Sodium.	Turpentine.
Cannabis Ind.*	Saponine.	Potassium.	Colchicum.
		Kava root.	

Those with* first excite slightly and then depress.

Therapeutics.—Chloral hydrate, bromides, physostigmine, calabar bean, opium, cannabis Indica, and chloroform or ether inhalation are ordinarily used to check convulsions, as in tetanus.

(*b*) *Drugs which indirectly depress the reflex movements.*—These act by arresting the circulation of the spinal cord. Aconitine, digitalin, and large doses of quinine are powerful in this respect.

E. Drugs which act on the cerebrum.—The structure of the brain being even more complicated than that of the cord, our knowledge of the pharmacology of this organ is necessarily still more obscure. Although we can influence the functions of the brain more rapidly, yet we cannot localise the action of drugs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

However, they are found to obey *two general laws* while acting on the brain, *viz.*—

a. The law of dissolution.—This was first described by Jackson, and consists in the progressive action of a drug on the nerve-centres in the inverse order of their development in animal life, *i.e*, those that are the highest and developed last are affected first, and then the next highest, and so on, until the lowest ones are affected. Thus, alcohol paralyses first the highest centres, as of will, intellect, &c., then those of the muscles as is evidenced by staggering gait, and lastly those of the heart and respiration (see Alcohol).

β. The law of primary stimulation and subsequent depression.—This is well illustrated by the action of a drug which in small doses stimulates certain functions, and in large doses depresses them. Thus, chloroform in the first stage of its action stimulates the motor cells, producing tetanic movements; but in the later stage, depresses them and causes a relaxation of the muscles.

I. Drugs that affect the functions of the cerebrum or brain.

(*a*) **Cerebral stimulants.**—These excite the functional activity of the brain. If the excitement becomes disorderly so as to lead to incoherence and delirium, they are called *deliriants.* If they produce mirthful and comfortable feelings, they are then known as *exhilarants.* They are :—

Alcohol.	Stramonium.	Tobacco.	Quinine.
Chloroform.	Hyoscyamus.	Tea.	Salicylic acid.
Ether.	Cannabis Ind.	Coffee.	Santonin.
Nitrous oxide.	Opium.	Coca.	
Belladonna.	Camphor.	Guarana.	

Of these, belladonna, hyoscyamus, stramonium, cannabis Indica are **deliriants.**

Therapeutics.—Many of these depress after primary stimulation. Some of the above are habitually consumed, *e.g.*, tea, coffee, coca, tobacco, opium, ganja, and alcohol. Alcohol and opium are very powerful cerebral excitants. In cases of fainting, shock due to accidents to the head, drowning, &c., alcohol, ether, chloroform, and cardiac stimulants become necessary.

(*b*) **Cerebral depressants.**—These drugs lessen the functional activity of the brain, and can be classified into (1) *hypnotics*, (2) *narcotics*, (3) *general anodynes*, and (4) *general anæsthetics.*

(1) *Hypnotics or soporifics* are remedies which induce sleep. During normal sleep, both arteries and veins remain contracted, and the brain becomes anæmic. Therefore, to produce sleep, we must (*a*) lessen its activity, and (*b*) reduce its circulation. We can do this by *direct* and *indirect measures.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

a. The direct hypnotics act by reducing the cerebral metabolic processes either by directly acting on the nerve-cells or affecting them through the circulation. They are :—

Chloral hydrate.	Trional.	Urethane.	Ural.
Sulphonal.	Paraldehyde.	Chloralose.	
Bromides.	Chloralamide.	Tetronal.	
Narcotics, (q.v.).	Cannabis Ind.	Hops.	
Hyoscyamine.	General anæs.	Hedonal.	
Hyoscine.	thetics (q. v.)	Somnal.	

β. The indirect hypnotics act by drawing the blood away from the brain elsewhere, by increasing the activity of circulation. Thus by the application of a warm poultice to the abdomen, by warm foot-baths, warm drinks, and warm wet-pack, we can indirectly induce sleep. Digitalis is an excellent indirect hypnotic. It acts by increasing the contractile power of the arteries leading to the brain, and thus prevents cerebral vascularity, which so often occurs merely from recumbent position in enfeebled and atonic conditions of the body.

Therapeutics.—The cause of insomnia must, if possible, be removed. Sleep is better induced by combining the direct with the indirect hypnotics. Chloral hydrate, sulphonal, bromides produce almost natural sleep. Morphine or opium is an excellent hypnotic, if the sleeplessness is due to pain. Toleration is often induced by these drugs. Bromides are indicated when the insomnia is due to overwork, mental worry and anxiety.

(2) *Narcotics*, as Brunton defines, are "substances which lessen our relationship with the external world." Hence, they include (*a*) the *direct hypnotics*, (*b*) the *general anodynes* and (*c*) the *general anæsthetics*. Narcotics induce sleep and relieve pain in moderate doses, but are powerful respiratory and vascular depressants in large doses. The followlng act as narcotics when given in large doses :—

Opium.	Stramonium.	Chloral hydrate.
Belladonna.	Cannabis Ind.	General anæsthetics.
Hyoscyamus.	Alcohol.	Hops.

(3) *General anodynes or analgesics.*—These relieve pain by depressing the excitability of nerves or nerve centres. They act by arresting the conduction of afferent impressions either at the seat of origin in the course of transmission, or at the point where they affect the sensorium. They are :—

Opium.	Hyoscyamus.	General anæsthetics
Morphine.	Stramonium.	(in small doses).
Belladonna.	Cannabis Ind.	Phenazone.
Atropine.	Hyscyamine.	Phenacetin.
Butyl-chloral.	Gelsemium.	Acetanilide.
Conium.	Chloral.	

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Of these, the action of opium is most marked. It relieves pain by arresting the afferent impressions at all the points mentioned above. Belladonna does this by depressing the excitability of the sensory nerves, and chloral hydrate, butyl-chloral, gelsemium, etc., by lessening the excitability of the cerebral centres.

Therapeutics.—Direct general anodynes are indicated in cases where pain is so intense as to produce loss of sleep, and to cause disturbance of the whole system. Opium or morphine in a variety of forms can be administered by various routes (see p. p. 102-4); the hypodermic method being the quickest and the most powerful. Belladonna in large doses is very useful in urinary colic. If we desire to have the anodyne effect produced more completely and quickly, we must use general anæsthetics, as in parturition, severe biliary and urinary colic. Phenazone, gelsemium, butyl chloral, &c. relieve neuralgias.

(4) *General anæsthetics.*—These drugs abolish consciousness and voluntary action so that no pain is felt. General anæsthesia can be induced by **indirect** and **direct** measures. Indirectly, it can be done by (1) arresting the cerebral circulation and thereby stopping the metabolism of the nerve-cells, either by compression or ligature of the carotids, or by combined pressure over the carotids and vagi; (2) by diminishing the oxidation of the nerve-cells by increasing the venosity of the blood, as in poisoning by charcoal gas; and (3) by draining the blood from the head to other parts of the body, as by suddenly lifting a patient to a standing posture after he has been laid flat on the ground. Directly, by the inhalation of chloroform, ether, nitrous oxide and several derivatives of ether and alcohol. These remedies, while acting as direct general anæsthetics, very well illustrate the *two general laws of cerebral pharmacology* already mentioned in page 158.

Therapeutics.—The direct general anæsthetics are given:—

(1) To produce insensibility to pain, as in biliary and renal colic.

(2) To remove consciousness, as in surgical operations.

(3) To relax or remove muscular spasm or activity, as in tetanus, hydrophobia, poisoning by strychnine, and in the reduction of hernia, dislocations and fractures.

(4) To diagnose certain obscure diseases, such as phantom tumors caused by the contraction of the abdominal muscles.

(*c*) **Drugs that act on the motor centres of the brain.**—The investigation of the pharmacology of drugs on the motor area of the brain is not difficult. The motor centres being situated on the two sides of the fissure of Rolando, the cortical substance of the motor area is exposed by trephining, and stimulated by faradic current, before and after the administration of a drug, and the strength of the current necessary to produce a

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

similar movement before and after drugging is noted. Another experiment is to expose the cortex on one side and to estimate the strength of current necessary to produce a convulsion, and then to close the wound and allow it to heal. The animal is then drugged for several weeks, and the corresponding area on the opposite side is exposed, and the strength of current to produce a similar convulsion is noted. From these experiments we have been able to deduce the following results :—

(1) *Drugs that depress the excitability of the motor centres* are chiefly the bromides. Alcohol, ether and chloroform have a similar effect. Chloral hydrate reduces the excitability temporarily.

Therapeutics—Bromides and chloral hydrate, especially the former, are employed in convulsive disorders ; such as epilepsy, hysteria, puerperal eclampsia, infantile convulsions, &c.

(2) *Drugs that increase the excitability of the motor centres.*—It is very difficult to say whether these drugs act directly on the motor nerve-cells, or influence them by increasing the venosity of the blood, through their action on the respiratory and circulatory centres. Of this group, strychnine, atropine, physostigmine and absinthe are the most powerful.

F. Drugs that influence the cerebellum.—We know very little of the functions of the cerebellum, except that it controls all co-ordinated movements. Alcohol in large doses causes staggering gait, thickness of speech, and irregular movements of the hands, thereby illustrating its action on the cerebellum. Apomorphine in toxic doses does not produce vomiting in animals, but makes them go round and round.

CLASS XII.—DRUGS THAT ACT ON THE EYE.

A. Drugs that act on the conjunctiva.—These may be divided into the following groups, according to their local action on this membrane.

Astringents.	Sedatives.	Antiseptics.	Irritants.
Alum.	Cocaine.	Boric acid.	Iodine.
Lead acetate.	Atropine.	Boro-glyceride.	Calomel.
Zinc sulphate.	Opium.	Corrosive sublimate.	Yellow mercuric
,, chloride.	Belladonna.	Carbolic acid.	oxide.
Corrosive sublimate.	Eserine.	Potassium per-	Silver nitrate.
Tannin.	**Anæsthetics.**	manganate.	Copper sulphate.
Silver nitrate.	Cocaine.	Quinine.	Jequirity seeds.

Therapeutics.—Cocaine is chiefly used in ophthalmic practice to lessen pain and produce local anæsthesia. Boric acid is used as an antiseptic wash in conjunctivitis. Astringent collyrium containing zinc sulphate, alum, silver nitrate, tannic acid, &c; reduces the inflammation, but alum and lead acetate are objectionable, as the former may dissolve the corneal cement, and the latter may be deposited as an insoluble albuminate if there is a

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

corneal ulcer. Calomel is an effective stimulant and absorbent in pustular conjunctivitis. Iodine removes recent opacities of the cornea. Yellow mercuric oxide ointment (diluted) and copper sulphate are good applications for granular lids. Tannin removes pannus.

B. Drugs that act on the lachrymal glands.—Local irritants and pilocarpine increase the flow of tears. Prolonged use of atropine does the contrary.

C. Drugs that act on the pupil.—The iris is the regulator of the pupil. It is composed of two sets of muscular fibres, the circular which contract, and the radiating which dilate the pupil. The sphincter iridis (circular fibres) is innervated by the third nerve, and the centre for the contraction of the pupil is located in the corpora quadrigemina. Stimulation of the third contracts, and its section dilates the pupil. The cervical sympathetic is the nerve of the radiating fibres. Its stimulation causes dilatation, and its division contraction of the pupil. The cilio-spinal centre controls dilatation.

1. **Drugs that act on the iris.**—

(*a*.) **Drugs that dilate the pupil** are called **mydriatics or pupil-dilators.** They act :—

(1) *By paralysing the terminal ends of the third nerve.*—As atropine, homatropine, euphthalmine, daturine, hyoscyamine, conine, gelsemine, aconite, amyl nitrite, muscarine and hydrocyanic acid. The action of the last five is rather doubtful.

(2) *By stimulating the terminal ends of the cervical sympathetic.*—As cocaine.

(3) *By stimulating the sympathetic centre.*—As anæsthetics in the later stage of their action.

Many of them such as atropine, daturine, hyoscyamine act locally as well as when given by the mouth.

(*b*) **Drugs that contract the pupil** are called **myotics or pupil-contractors.** They act :—

(1) *By stimulating the terminal ends of the third nerve.*—As pilocarpine and nicotine (?).

(2) *By stimulating the sphincter iris.*—As physostigmine.

(3) *By stimulating the centre for contraction.*—As opium and general anæsthetics in the early stage of their action.

Some of the myotics, such as physostigmine, contract the pupil if locally applied, and when introduced into the circulation.

Therapeutics.—The mydriatics are used :—

(1) To break down or prevent adhesions of the iris, as in iritis.

(2) To prevent prolapse of the iris, or to restore it to its normal position if already prolapsed in corneal perforation.

(3) To dilate the pupil for ophthalmoscopic examination.

The myotics (especially eserine) are used :—

(1) To counteract the effects of mydriatics.

(2) To prevent much light entering the pupil.

(3) To lessen intra-ocular tension in glaucoma.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

D. **Drugs that act on the ciliary muscle.**—This muscle adjusts the lens for distant and near objects of visio·. During rest, the lens remains flattened, but to see nearer objects, it becomes more convex owing to the drawing in of the ciliary processes by the contraction of the circular fibres. It is supplied by the third nerve.

1. **Drugs that impair the accommodation of the lens.**—Drugs which affect the iris, influence also the accommodation. Both mydriatics and myotics do this.

2. **Drugs that affect the intra-ocular tension.** They are of two kinds.—

(*a*) *Drugs that increase the tension* are atropine, hyoscyamine, and daturine in large doses.

(*b*) *Drugs that diminish the tension* are cocaine, physostigmine and hyoscine.

E. **Drugs that affect the sensory apparatus of the eye.**—Strychnine increases the sensitiveness to impressions and capacity for seeing blue. Santonin affects the sense of color, objects appearing first violet and then yellow.

F. **Drugs that produce subjective sensations of sight.**—Cannabis Indica produces pleasant and laughable visions in some persons. Alcohol in toxic doses induces visions of a disagreeable nature (delirium tremens). Sodium salicylate does the same. Quinine, tobacco and lead cause a failure of sight for form and certain colors.

G. **Drugs that act on the ocular muscles.**—Gelsemium causes paralysis of the ocular muscles, particularly the levator palpebræ and rectus externus. Conine causes ptosis, and cocaine protrusion of the eye-ball.

CLASS XIII.—DRUGS THAT ACT ON THE EAR.

A. **Drugs that act on the aural mucous membrane.**—These may be classified into **local anodynes** or **local sedatives, local astringents, local antiseptics** and **emollients.** To relieve pain due to catarrhal inflammation of the mucous membrane, we use opium, morphine, belladonna, atropine, chloral c. comphor, warm boric acid lotion, cocaine (alkaloid) dissolved in warm oil, &c. In otorrhœa lotions containing boric acid, potassium permanganate, zinc sulphate should be injected, and, insufflations of powdered boric acid and iodoform separately or mixed together, may be used. Glycerin acid tannic sometimes does more good than many antiseptic injections. For dryness of the membrane, glycerin and bland oils are serviceable.

B. **Drugs that act on the cerumen.**—An accumulation of wax sometimes gives much trouble. Syringing the ear with plain warm water, or a warm solution of sodium bicarbonate (10 grs. to 1 oz.) greatly assists the removal.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

C. Drugs that affect the sense of hearing.—Strychnine increases the excitability of the auditory nerve or the auditory centre, thereby increasing the acuteness of hearing. Quinine and salicylic acid create subjective noises, such as ringing, buzzing, &c., which can, to a great extent, be removed by hydrobromic acid dilute or occasionally by ergot.

CLASS XIV.—DRUGS THAT ACT ON THE GENERATIVE SYSTEM.

A. Drugs and agents which increase the sexual passion and power are called **aphrodisiacs.** These may be **direct** or **indirect.** The true genital centre being situated at the lumbar portion of the spinal cord, can normally be excited by various afferent impressions brought from various sources, such as eye, nose, ear, mamma, rectum, bladder, prostate, nates, cerebrum and general surface of the body. Drugs can stimulate this centre in the following ways :—

1. **Direct Aphrodisiacs act :—**

(*a*) *By increasing the excitability of the nerves passing to or from the genital organs, or of the genital centre* ; as strychnine, nux vomica, damiana and probably phosphorus.

(*b*) *By stimulating the cerebrum and reflexly the genital centre* ; as opium, cannabis Ind., camphor and alcohol in small doses.

(*c*) *By irritating the nerves of the urinary, genital and adjoining structures and thereby reflexly the genital centre*; as cantharides, blatta orientalis, acidity of urine, nitrate and chlorate of potash.

2 **Indirect Aphrodisiacs.**—They act by removing constitutional disorders and improving the general health. Thus, by curing diabetes, albuminuria, gout, chronic malarial fever, &c., we improve sexual power. Iron, general tonics, alteratives, generous diet especially meat, indirectly act as aphrodisiacs by improving general health.

Therapeutics.—In functional impotency, both the direct and the indirect aphrodisiacs should be used. Of the direct ones, strychnine, phosphorus, and damiana are reliable and useful. Cantharides should be used with great caution.

B. Drugs that diminish the sexual passion and power are called **anaphrodisiacs.** They may also act *directly* or *indirectly*. Thus :—

1. **Direct Anaphrodisiacs** may act :—

(*a*) *By lessening the excitability of the nerves of the genital organs* ; as by the local application of ice and cold bath, bromides.

(*b*) *By depressing the excitability of the genital centre* ; as by bromides, iodides and conium ; opium, hyoscyamus, belladonna and stramonium in large doses.

(*c*) *By reducing the circulation of the genital organs or the lumbar portion of the cord* ; as by ergot and digitalis.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*d*) *By depressing or removing afferent impulses which reflexly excite the genital nerves and genital centre*; as alkalis if due to acid urine.

2. **Indirect Anaphrodisiacs** are measures of a moral and hygienic nature, such as exercise of the upper limbs, meagre and vegetable diet, avoidance of stimulants, of warm heavy clothing, of feather bed, of obscene works, of amorous songs, of distension of the bladder, of fæcal accumulation, and removal of ascarides and of uric acid crystals from the urine.

Therapeutics.—When the sexual passion is abnormally excited, we use both direct and indirect anaphrodisiacs, but the cause of excitement should be looked for and removed. Large doses of bromides are very useful in satyriasis and nymphomania.

C. Drugs that act on the uterus.

1. *Drugs which cause expulsion of the contents of the uterus* are called **ecbolics**, or **oxytocics**. They act by contracting the unstriped muscular fibres of the uterus either **directly** or **indirectly**. The direct ecbolics are :—

Ergot.	Hydrastis.	Suprarenal extract.
Quinine.	Borax.	Cotton root bark.
Savin.	Drastic purgatives.	
Rue.	(indirectly).	

Of these, ergot is the most powerful. The action of quinine is uncertain. It generally intensifies and increases the labor-pains. The writer has seen a female who took about 6 drs. of quinine within one week to induce abortion without any effect. All direct ecbolics act as emmenagogues in moderate doses.

2. *Drugs which increase or restore the menstrual flow* are called **emmenagogues**. They may be either **direct** or **indirect**.

(*a*) **Direct emmenagogues** act by gently stimulating the non-gravid uterus and thus increasing the menstrual flow :—

Ecbolics (in small doses).	Asafetida.	Guaiacum.	Apiol.
	Myrrh.	Cantharides.	

(*b*) **Indirect emmenagogues act** :—

(1) *By improving the quality of the blood, e.g.*, iron, manganese and codliver oil.

(2) *By improving the tone of the nervous system, e.g.* nux vomica and strychnine.

(3) *By increasing the vascularity of the uterus*; *e.g.* hot hip-bath, hot mustard-bath (see p.p. 65-5), mustard poultices and leeches to the thighs and genitals.

(4) *By irritating the adjacent organs or structures and thereby reflexly stimulating the womb, e.g.* aloetic purgatives.

(5) *By removing or neutralising any specific poison*, as of malaria by quinine and iron, or of phthisis by codliver oil.

Therapeutics.—The cause of the suppression of the menstruation should be looked for and removed. If it is due to a

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

sudden chill, aconite and hot hip-baths are very useful. If it is due to anæmia, iron is the best remedy. Delayed or absent flux is restored by permanganate, aloes and myrrh. Sometime stronger emmenagogues, such as ergot or savin become necessary.

3. *Drugs which depress the uterine contraction* are sometimes called **uterine sedatives or depressants** As opium, viburnum prunifolium, cannabis Indica, chloral, bromides, tartarated antimony.

D. Drugs that act on the mammary glands.

1. *Drugs which increase the secretion of the milk*, are called **galactagogues** : as jaborandi, oils of dill and anise, local application of the leaves of castor-oil plant to the breasts, and alcohol. The action of alcohol is very feeble.

2. *Drugs which decrease or stop the secretion of the milk* are called **antigalactagogues** ; as belladonna either applied locally or given internally.

3. *Drugs which alter the composition of the milk.*—

Several drugs are eliminated by the milk and affect suckling babes. Thus, rhubarb, senna, jalap, sulphur, scammony, castor-oil may produce looseness in children, when given to their mothers. By giving mercury, iodides, iron and arsenic to the nurse we can affect infant. Opium should never be given to nursing mothers. Acids given to the mother may cause griping to her child. Copaiba, garlic, asafetida and oil of turpentine impart a disagreeable flavor to the milk (see p. 117). Salts increase the saline ingredients of the milk.

Class XV.—Drugs that act on micro-organisms or their life-processes in or outside the body.

A. **Antiseptics** are substances which prevent or retard putrefactive changes, *i.e.* decomposition of vegetable or animal bodies. They include the following :—

1. **Disinfectants** are substances which destroy pathogenic microbes *i.e.* those which cause communicable diseases.

Hydrogen peroxide, mercuric chloride, silver nitrate, chromic acid and copper sulphate are the most powerful. It is doubtful whether any antiseptics taken in medicinal doses can destroy micro-organisms within the body, though many of them are used for this object (see p.p. 124 and 130).

2. **Deodorants or deodorizers** are substances which destroy offensive or disagreeable odor. Many antiseptics can remove bad smells, but potassium permanganate, iodoform, dry charcoal and oils are the most powerful in this respect.

B. **Antiparasitics or parasiticides** are substances which kill parasites infesting the surface of the body. The drugs which act on intestinal parasites are called **anthelmintics** (see p. 130).

These drugs may again be subdivided according to their actions on the different varieties of parasites. Thus we apply for :—

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(1) **Tinea and its varieties** ; mercurial ointment (see p. 60), iodine, carbolic acid (glycerin), pyrogallic acid, salicylic acid, boric acid, thymol, sulphurous acid, formalin, chrysarobin, and local irritants, such as croton oil, cantharides, &c.

(2) **Scabies or itch** ; Ung sulph., sulphur fumigation, storax, Peruvian balsam, sandal-wood oil.

(3) **The various kinds of Pediculi or lice** ; mild mercurial ointments, as, Ung. hydrarg. ammon., Ung. staphisagriæ., Ung. cocculus Indicus (*kakmari* ointment).

C. **Antiperiodics** are drugs that prevent the occurrence of certain disease which tend to return periodically. They probably act by destroying the specific micro-organisms. *e.g.* the malarial parasites causing ague. They are :—

Quinine.	Salicin.	Rasot.	Warburg's tincture.
Euquinine.	Salicylates.	Eucalyptus.	Kurchicine.
Cinchonine.	Nimbark.	Iodine.	Ditain.
Atis.	Beberine.	Alstonia.	Berberine.
Arsenic.	Methylene blue.	Piperine.	

Of these, quinine salts, euquinine, arsenic and methylene blue are the most successful.

Therapeutics.—Most of them are given in intermittent fever and intermittent neuralgia. Beberine has been found to be an effective remedy in malarial fevers of pregnant females. Rasot—extract of the bark of *Berberis Asiatica*, and *B. Lycium*.—gives good results in the chronic malarial fever of children with hepatic derangement. Warburg's tincture is rarely used now. Kurchicine, an alkaloid from the bark of *Wrightia antidysenterica* or *Holarrhena antidysenterica*, is a valuable remedy for chronic dysentery complicating malarial fever. The writer has used it in many cases. Atis, the root of *Aconitum Heterophyllum*, is much esteemed as a febrifuge in this country.

PRIYA PARIJAT SEN

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PART V.

MATERIA MEDICA AND THERAPEUTICS.

(In this part, all the official remedies proper, including their chief non-official preparations and derivatives, will be described. The pharmacopœial or the alphabetical arrangement of drugs will be followed, but the composition of their official preparations will not be repeated, (see p.p. 16—51), except their strengths, doses, and in some instances, their actions, uses and special characteristics.)

ACACIA CORTEX. Acacia Bark.

N.O. *Leguminosæ.*

(*Ind. and Col. Addendum.*)

Synonym Indian Vernacular.—*Bábla chhál*, Beng. *Bábulká chhál*, Hind.

Habitat.—India, Eastern and Australasian Colonies.

Source.—The dried bark of *Acacia Arabica* also of *Acacia Decurrens*, the Black-Wattle.

Characters.—A hard brown bark, reddish on the inner surface. Taste astringent.

Composition.—Contains much tannin. (20 per cent.).

Incompatibles.—Iron salts and all incompatibles of tannin.

Action.—Astringent.

Official Preparation.

1. **Decoctum Acaciæ Corticis.**—1½ oz. to 24 ozs. of water boiled for 10 minutes. **B.P. Dose.**—½ to 2 ozs.

Pharmacology and Therapeutics.

May be used as an astringent injection and gargle, or 1 to 2 oz. doses may be given in diarrhœa.

ACACIÆ GUMMI. Gum Acacia.

N.O. *Leguminosæ.*

Syn. I. V.—*Gand*, Beng. *Bábul-ká-gand*, Hind.

Habitat.—Kordofan.

Source.—A gummy exudation from the stem and branches of *Acacia Senegal*, and of other species of *Acacia*.

Characters.—Ovoid or round tears or masses, colorless, glistening or yellowish angular fragments; odorless; taste mucilaginous. *Solubility.*—Entirely in water, insoluble in alcohol. *Impurities.*—Starch, dextrin, tannic acid, sugars, mineral matters, and inferior gums of many species of *acacia* and of other plants found in India.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Composition.—*Arabin* or arabic acid, combined with calcium, potassium and magnesium.

Incompatibles.—Alcohol, sulphuric acid, persalts of iron, borax, and lead acetate. The last three render it gelatinous (see p 81).

Action.—Demulcent, emollient.

Enters into.—Pulv. Amyg. Co., Pulv. Tragac. Co., Pil. Ferri, Pil. Phosph. and all Trochisci, and the

Official Preparation.

1. **Mucilago Acaciæ.**—4 and 6. *Dose.*—1 to 4 drs.

Enters into.—The preparation of Lozenges, Jujubes, Pastils, and Mist. Ol. Ricini.

Pharmacology and Therapeutics.

Gum acacia is feebly nutritive, being converted into sugar in the intestine. It is given as an **emollient** in sore throat, catarrhal states of the gastric, intestinal or bronchial mucous membranes; and as a **demulcent** in irritant poisoning. It is a **reflex expectorant.** In Pharmacy, it is chiefly used to suspend insoluble powders, resins, oils, and as an excipient for pills, jujubes, &c.

ACALYPHA. Acalypha.

N.O. *Euphorbiaceæ.*

(*Ind. and Col Addendum*).

Syn. I.V.—*Muktabarshi*, *Muktajhuri*, Beng. *Rupi*, *Kokli*. Hind. Bom.

Source.—The fresh and dried herb, *Acalypha Indica.*

Characters.—An annual plant. Stem erect, 1 to 2 ft. high; leaves ovate-cordate, serrated. Spikes axillary. Male flowers uppermost enclosed in a funnel-shaped involucre. Stamens 8 to 16; styles 3; capsules tricoccus, three-celled, one-seeded. Flowers small, green.

Official Preparations.

1. **Extractum Acalyphæ Liquidum.**—Dried herb 20 ozs. Alcohol (90 p.c.) *q.s.* to produce 1 pint by percolation. **B.P. Dose.**—5 to 30 ms.

2. **Succus Acalyphæ.**—Expressed juice 3, Alcohol (90 p.c.) 1. Filter after 7 days. **B.P. Dose.**—1 to 4 drs.

Pharmacology and Therapeutics.

Internally.—The fresh juice is a **stimulant expectorant, emetic** and **laxative,** used in bronchitis and croup of children. It is a valuable emetic, being safe, speedy and certain in its operation. It produces loose bilious stools, especially if the root bruised with water is administered. A thick paste introduced into the rectum, as a suppository causes a gentle action of the bowels.

It is doubtful whether the dried herb possesses the same virtues as the fresh one.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ACETANILIDUM. Acetanilide.

$CH_3 \cdot CO\ NH\ C_6H_5$

Syn. B.P.—Phenyl-acetamide, commonly known as "Antifebrin."

Source.—Obtained by the interaction of glacial acetic acid and aniline and purification.

Characters.—Colorless, inodorous, glistening, lamellar crystals; taste pungent. Melts at 236·5°F. *Solubility.*—1 in 200° of cold, 1 in 18 of boiling water, freely in chloroform and ether. *Impurities.*—Acetone, phenazone, free acid and salts of aniline.

Action.—Powerfully antipyretic, analgesic. **B.P. Dose.**—1 to 3 grs. *Single Maximum Dose.*—8 grs. *Daily Dose.*—20 grs.

Prescribing hints.—In cachets, in diluted brandy or wine, or suspended in water by Pulv. Tragacanth. Co.

Non-official Preparations and Derivatives.

1. **Ammonol.** *Syn.*—*Ammoniated Phenylacetamide.*—A white powder sparingly soluble in water, containing equal parts of Ammonium Carbonate and Acetanilide. *Dose.*—5 to 20 (?) grs.

2. **Antikamnia.** *Syn.*—*Pulv. Acetanilid Co. B.P.C.*—An American speciality containing approximately, Acetanilide 70, Caffeine 10, and Sodium Bicarbonate 20. *Dose.*—3 to 5 grs. Used in headache.

3. **Antinervin.** *Syn.*—*Salbromalid.*—A mixture of Salicylic Acid, Potassium Bromide and Acetanilide. *Dose.*—3 to 5 grs.

4. **Antisepsin.** *Syn.*—*Monobromacetanilide.*—White acicular crystals. Suggested for facial neuralgia and neuritis. *Dose.*—3 to 15 grs.

5. **Salefebrin.** *Syn.*—*Salicylanilide.*—A white powder insoluble in water. Acts like a concentrated salicylic acid. Used in acute rheumatism and migraine. *Dose.*—5 grs.

Pharmacology and Therapeutics.

Same as those of phenazonum and phenacetinum. (*q. v.*)

ACIDUM ACETICUM. Acetic Acid.

Hydrogen Acetate. $CH_3 \cdot COOH$. 33 p.c. by weight in water.

Source.—Prepared by the destructive distillation of wood, or by the oxidation of ethylic alcohol.

Characters.—A colorless acid liquid with a pungent odor. Sp. gr. 1·044. *Impurities.*—Copper, lead, arsenic, and sulphuric, nitric, hydrochloric and formic acids.

Identification.—The peculiar vinegary smell is characteristic.

Action.—A local stimulant and irritant, refrigerant, sialagogue and antiseptic.

Enters into.—Oxymel, Oxymel Scillæ, Liq. Ammon. Acetat., Liq. Morph. Acet., many Acetates, and the

Official Preparation.

1. **Acidum Aceticum Dilutum.**—1 in 8 or 4·27 p.c. of hydrogen acetate. Refrigerant, diuretic. **B.P. Dose.**—½ to 2 drs.

Enters into.—Acet. Ipecac., Acet. Scillæ, and Liqr. Morph. Acet.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

NON-OFFICIAL PREPARATION.

1. **Acidum Trichloraceticum. P. G.**—In deliquiscent crystals a 1% solution is a powerful stimulant for granulating surfaces, and is also a very useful application for the Phagedænic ulcerations of the cheek which are so common in the terminal stages of Malarial Cachexia and Leishman-Donovan disease.

ACIDUM ACETICUM GLACIALE.

Glacial Acetic Acid.

Source and Characters.—A concentrated, colorless liquid, with a very pungent odor, containing 99 p. c. of hydrogen acetate. Crystallises below 60° F. Sp gr. 1 058 *Solubility.*—Freely in water and absolute alcohol. *Impurities.*—The same as those of acetic acid.

Action.—Escharotic.

Enters into.—Acet. Canth., Lin. Terebinth. Acet. and Liq. Ferri Acet.

NON-OFFICIAL PREPARATION.

1. **Acetum.** *Vinegar.*—Contains 5·41 p. c. of hydrogen acetate. An acid liquid obtained by the acetous fermentation of malt and unmalted grains. *Dose.*—1 to 8 drs. Country vinegar (*sirkâ*) is made from the saccharine juice of plants.

PHARMACOLOGY AND THERAPEUTICS.

The action of acetic acid resembles more or less that of the mineral acids.

Externally.—Glacial acetic acid is a **caustic** and is therefore used in destroying **corns, warts** and small **cancerous growths.** It speedily **vesicates,** and may be used in those cases where cantharides cannot be employed, but it causes much pain, and if not cautiously applied, may produce a nasty sore. When inhaled, in the form of aromatic vinegar, it reflexly stimulates the vaso-motor centre and increases blood-pressure, and is useful in **syncope** and **cardiac depression.**

Acetic acid destroys **tinea,** and is an effective application for ringworm. Vinegar or diluted acetic acid is an **external refrigerant,** and may be used as a **cooling lotion** in **cerebral congestion, sprains** and **bruises** ; and sponging with vinegar will **reduce pyrexia** and **check excessive sweating.** Vinegar is sometimes used topically to check **epistaxis,** &c.

Internally.—Diluted acetic acid **allays thirst** by increasing the salivary secretion, and may be used as a **gargle** (15 ms. to 1 oz.) in cases where dryness of the mouth is a troublesome symptom.

After prolonged use, it diminishes the number of red blood corpuscles, and therefore, its employment in **obesity** is contra-indicated. As an internal refrigerant, it may be given in **fevers, cholera, diabetes, Bright's disease,** &c.

Acetic acid is excreted in the urine as a carbonate. Given in large doses, it passes out unchanged.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Antidotes.—The same as those for the mineral acids. No stomach pump.

Prescribing hints.—Used diluted with water. As a caustic undiluted.

ACIDUM ARSENIOSUM.

Arsenious Anhydride. As_4O_6.

Syn. B.P.—Arsenic. White Arsenic. Arsenious Acid. **Syn. I. V.**—*Sánkhiá*, Hind. *Sanko*, *Simulakkár*, Beng.

Source.—Prepared by roasting certain arsenical ores.

Characters.—A heavy white powder or in stratified opaque masses. *Solubility.*—1 in 100 of cold, 1 in 10 of boiling water, and 1 in 5 of glycerin. *Impurities.*—Lead, antimony, tin, cadmium, gypsum and chalk.

Identification.—Arsenious anhydride resembles pieces of broken china in appearance. Its white porcelain-like appearance, glassy fracture and weight are characteristic. In crystalline form an expert can readily recognise it, but there is nothing characteristic about the powder.

Tests.—(1) Its aqueous solution gives a canary yellow precipitate with silver ammonio-nitrate, readily dissolved by ammonia solution and nitric acid. (2) Sprinkled over ignited charcoal it emits a garlic-like odor. (3) In organic solution, arsenic is detected by adding HCl and distilling, when the volatile chloride is found in the distillate. (4) Acidulated with HCl, it gives a yellow precipitate with H_2S. (5) Marsh's and Reinsch's special tests.

Incompatibles.—Lime water, iron salts, magnesia, and astringent substances.

Action.—Alterative, tonic, antiperiodic, caustic. **B. P. Dose.**—$\frac{1}{60}$ to $\frac{1}{10}$ gr. *S. M. Dose.*—$\frac{1}{12}$ gr. *Daily Dose.*—About $\frac{1}{6}$ to $\frac{1}{4}$ gr.

Official Preparations.

1. **Liquor Arsenicalis.** *Syn.*—*Liq. Potassæ Arsenitis. Fowler's Solution.*—1 gr. in 110 ms.* Pinkish, *alkaline* with a lavender odor. **B.P. Dose.**—2 to 8 ms. diluted.

2. **Liquor Arsenici Hydrochloricus.**—1 gr. in 110 ms. This is 3 times the strength of De Valangin's Solvent. A colorless *acid* liquid. **B.P. Dose.**—2 to 8 ms. diluted.

ARSENII IODIDUM.

Arsenious iodide. AsI_3.

Source and Characters.—Small soluble, orange-colored crystals, prepared by the direct combination of iodine and arsenic.

Action.—Tonic, alterative, antiperiodic. **B.P. Dose.**—$\frac{1}{20}$ to $\frac{1}{6}$ gr. *S. M. Dose.*—$\frac{1}{12}$. *Daily Dose.*—$\frac{1}{3}$ gr., in pill or solution.

Official Preparation.

1. **Liquor Arsenii et Hydrargyri Iodidi.** *Syn.*—*Donovan's Solution.*—1 gr. in 110 ms. A colorless *acid* liquid. **Action.**—Alterative, antisyphilitic. **B.P. Dose.**—5 to 20 ms.

* 1 gr. in 110 ms. is equivalent to a 1 per cent solution.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

FERRI ARSENAS. Iron Arsenate.

$Fe_3(AsO_4)_2,6H_2O$.

Source and Characters.—A tasteless, amorphous, greenish powder, prepared by the interaction of ferrous arsenate with ferric arsenate and iron oxide.

Identification.—Recognised by its *green* colour. Be careful not to mistake it for iron phosphate which is *blue*.

Action.—Alterative, tonic like Arsenious Acid. **B.P. Dose.**—$\frac{1}{10}$ to $\frac{1}{4}$ gr. in pill (see p.p. 85, 88.)

SODII ARSENAS. Sodium Arsenate.

Na_2HAsO_4

Source and Characters.—A soluble white powder obtained by exposing to 300°F. crystallised sodium arsenate, which may be prepared by treating with water the product of the fusion of arsenious anhydride with sodium nitrate and sodium carbonate. **B.P. Dose.**—$\frac{1}{10}$ to $\frac{1}{10}$ gr. in pill.

Official Preparation.

1. **Liquor Sodii Arsenatis.**—1 gr. in 110 ms. (Pearson's Solution is 1 in 600). A *colorless* solution having half the strength of Liq. arsenicalis. **Action.**—Produces less gastric irritation. Cures eczema readily. **E.P. Dose.**—2 to 8 ms.

Non-official Preparations of Acidum Arseniosum.

1. **Abernethy's Lotion.**—Liq. Arsenicalis 2 drs. to water 1 oz.
2. **Arsenical Cigarettes.**—Each contains $\frac{1}{4}$ gr. of Sodii Arsenas. The smoke is to be inhaled deeply 3 or 4 times.
3. **Cupri Arsenis.**—A pale-green amorphous powder. Useful in cholera, diarrhœa, dysentery, enteric fever in doses of $\frac{1}{300}$ gr. every 10 minutes for one hour, and then hourly for adults. For anæmia, chlorosis $\frac{1}{10}$ to $\frac{1}{5}$ gr. thrice daily.
4. **Liq. Arsenici Bromatus.** *Syn.*—*Clement's Solution of Arsenite of Bromine.* Useful in diabetes and epilepsy. *Dose.*—1 to 5 ms.
5. **Liq. Auri et Arsenii Bromidi. N.F.**—Acid arsenious 2·5 grm., Tribromide of Gold 3·25 grm., Bromine water *q. s.*, Distilled Water *q. s.* to 1,000 C.C. In syphilis, neurasthenia. *Dose.*—1 to 2 ms.
6. **Pasta arsenicalis** (dental).—Arsenic 4, Cocaine Hydro. 4, Menthol, Glycerin *q. s.* M. A piece of the size of a pin-head is to be put into the cavity of the tooth to destroy the dental nerve. A plug must then be inserted above the fragment of paste.
7. **Pasta Arsenici Escharoticus.**—Arsenic 1, Charcoal 1, Red Sulphide of Mercury 4, Aqua q.s. To destroy lupus, epithelioma, &c.
8. **Sodium Cacodylate** has been lately much praised especially in France for the treatment of anæmia due to various causes, phthisis, neurasthenia, diabetes mellitus, &c. It is a sodium compound of cacodylic acid which contains a large proportion of arsenic, and it is said that by means of this very large doses of arsenic can be given with safety and benefit. The salt is very deliquescent but can be given in perles or hypodermically. Pure cacodylic acid is very poisonous and has the characteristic odor of arseniuretted hydrogen. *Dose.*—$\frac{1}{12}$ to $\frac{1}{3}$ gr.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

9. **Pilula Asiatica** (Codex).—Acid Arsenious $\frac{1}{12}$ gr., black-pepper $\frac{3}{4}$ gr., Acacia *q.s.* M. In many chronic skin diseases. *Dose.*—1 to 2 daily.

10. **Unguentum Arsenicalis** (Sir A. Cooper's).—Acid Arsenious 1 dr., Sulphur 1 dr., Spermaceti Ointment 1 oz. Applied for 24 hours.

PHARMACOLOGY.

Externally.—Arsenic has no action on the unbroken skin, but on the denuded surface it is a powerful **irritant and caustic.** Unless applied in a concentrated form, poisoning may take place from absorption.

Internally. **Alimentary tract.**—In minute doses ($\frac{1}{60}$ to $\frac{1}{30}$ gr.) it increases the gastric vascularity and secretion, and thus improves appetite and digestion. It is therefore a **local gastric stimulant** and **stomachic.** In large doses, it is a powerful **gastro-intestinal irritant.** It is excreted into the stomach after absorption, even when subcutaneously injected.

Blood.—It is quickly absorbed, and has no action on the blood, except in anæmias of the pernicious type, where it increases the number of red corpuscles.

Heart and circulation.—In very small doses ($\frac{1}{2}$ to 1 m. of the solution), it increases the force and the number of cardiac beats. In large doses, it reduces blood-pressure and pulse-rate.

Metabolism.—Arsenic passes through all the organs and tissues, and is not known to combine with their albuminous constituents, though Dogiel says it does. During its brief stay in the tissues, it performs certain important functions. According to Binz and Schulz, it is a carrier of oxygen, which it receives and gives up, by the transformation of arsenious into arsenic acid at the expense of the oxygen of the protoplasm, and by the reduction of arsenic into arsenious acid by the venous and capillary blood. In the liver, it reduces the formation of glycogen, and produces when continued for any length of time a fatty degeneration. In other organs, it behaves in the same way, by interfering with their metabolic processes, and helping the deposition of fat. Short of this action, it **stimulates the general metabolism** of all organs and tissues, and **alters** their activity in such a subtle way, that many abnormal conditions of the system due to faulty nutrition are benefited. Therefore, it is a **general tonic** and **alterative.**

Respiration.—We do not know much about its action on respiration, except that habitual eaters of arsenic, such as the Styrian peasants, can undergo great bodily exertion without much difficulty and distress of breathing.

Nervous system.—In minute doses, it acts as a **nervine tonic.** In larger doses, it diminishes the sensibility and reflex excitability of the centres, and is found in the grey matter of the cord. Motor nerves and muscles are affected later on (peripheral neuritis).

Skin.—It is eliminated with the sweat, and causes itching and **eruptions,** which may be erythematous, papular, pustular,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

furuncular, pigmentary or urticarial. The skin of a frog poisoned by arsenic can be stripped off easily.

Bone.—Like phosphorus, it increases the compact tissue at the expense of the medullary.

Micro-organisms.—It is believed to affect the life-processes of the micro-organisms of certain diseases, such as malaria, phthisis, &c.

Elimination.—It is excreted chiefly in the urine as arsenious acid, also in the bile, sweat, saliva, tears and gastro-intestinal secretion but not in the milk.

Toleration can be induced, though instances of death from an over-dose are not infrequent.

Acute toxic action.—Colicky pains, severe vomiting and purging, cramps of the legs, intense thirst, prostration and collapse are the prominent symptoms, which may be mistaken for those of cholera. At the *post mortem*, the stomach and intestine are found inflamed, with occasional patches of softening of the mucous membrane. *Fatty degeneration of the liver, kidneys and heart* is found if the patient survives long enough. Sometimes, there may not be any gastro-intestinal irritation, death taking place during profound coma.

Antidotes.—Emetics, apomorphine. The pump must be used with great caution. Moist peroxide of iron freshly prepared by mixing tincture of steel with sodium or ammonium carbonates and straining rapidly through muslin, or dialysed iron in 1½oz. doses diluted, or in their absence, magnesia, animal charcoal, olive oil, lime water freely. Demulcents, and castor oil to clear the intestine, stimulants, hot water bottles, &c.

Chronic toxic action.—Chronic poisoning occurs amongst those who either handle arsenical pigments, inhale arsenical dust from wall-paper, dresses, &c., or consume wines* containing traces of arsenic. Loss of appetite, nausea, vomiting, colic, mild diarrhœa, œdema of the lower eye-lids, conjunctivitis, swelling of the joints are the symptoms generally observed, when arsenic is continued long medicinally in large doses. Peripheral neuritis, muscular paralysis of the limbs, ataxic gait, muscular atrophy, bronzing and patchy pigmentation of the skin and darting pains in the limbs are also noticed in many cases of slow poisoning.

THERAPEUTICS.

Externally.—An arsenical paste is used for destroying new growths, such as **lupus, condyloma, epithelioma,** &c., but it must be concentrated, and only a limited surface is to be treated, if the disease is extensive. The cancer-curers of North Ireland use arsenic as the chief basis of their remedies. Small **warts** and **corns,** after the paring of the hard skin, can be removed by painting with Liquor Arsenicalis. Arsenical cigarettes are sometimes smoked for the relief of **asthmatic fits,** and

* Peripheral neuritis was a marked symptom in the recent outbreak of arsenical poisoning in England, due to drinking contaminated beer. A case is also reported by Dr. A. Buchanan from Nagpur.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

phthisical dyspnœa, but such inhalation must be given with caution.

Internally. **Gastro-intestinal tract.**—Dental arsenical paste is employed to destroy the tooth-pulp in **caries** of the tooth, before stopping. In minute doses before meals, arsenic may be given in **irritative dyspepsia, vomiting of habitual drunkards vomiting** or **diarrhœa** excited by food, **gastric neuralgia** and **chronic ulcer** and **cancer of the stomach.** For other diseases of the alimentary tract, such as **cancrum oris** and **malignant sore throat,** it is given after food.

Heart and lungs.—In minute doses ($\frac{1}{4}$ to 1 m. of the solution), it **tones** up the heart in **angina** and exhausting febrile and other diseases. Prolonged administration checks the repetition of **asthmatic fits.** It gives signal benefit in paroxysmal **coryza, hay asthma** and wheezing of **emphysema, spasmodic bronchitis** and **chronic catarrhal pneumonia.** According to Brunton, it arrests **incipient phthisis,** by causing degeneration of the inflammatory nodules, and thereby preventing the bacillus from finding a suitable nidus.

Malaria.—It is both curative and prophylactic in malarious diseases, such as **ague** and **intermittent neuralgia.** A few cases of **relapsing fever** have yielded to arsenic in the writer's hands. In chronic malarious fever, it must he given in fairly large dosas ($\frac{1}{24}$ to $\frac{1}{12}$ gr.). The writer considers arsenic to be a useful remedy for arresting the paroxysmal febrile attacks of **elephantiasis arabum,** but it must be continued for 18 to 24 months, as one of his patients got a relapse after 1 year's treatment.

Nervous system.—In large doses, arsenic cures **chorea.** Children over 4 or 5 years of age can bear as large doses as adults. Beginning with 5 m. doses, liqr. arsenicalis may be pushed on to 15 ms. 3 or 4 times a day. Occasionally its action is very prompt if it is commenced in 10 to 15 m. doses, twice daily. Gowers speaks highly of it in **locomotor ataxy.** Many other spasmodic diseases, especially **pertussis** and **angina** are markedly benefited by it.

Kidneys.—Dr. Murray strongly recommends arsenic in **diabetes mellitus.** He uses 10 ms. of the solution three times a day for 2 or 3 months, after reducing the sugar by codeine. Occasionally it is prescribed in chornic **Bright's disease.**

Lymphomas.—In **Hodgkin's disease** (general lympha denoma), no remedy is known to be of any use except arsenic. Large **lymphomas** are said to have been absorbed by the continued use of arsenic internally and hypodermically.

Skin.—Chronic skin diseases, especially **scaly** and **papular** varieties are wonderfully benefited by arsenic. **Psoriasis, lichen chronic eczema, acne, pemphigus,** &c., yield to it. The writer used it in two cases of true **leprosy** with good result, but

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

they came under his treatment at the beginning of the disease. Within 3 months the eruptions disappeared. **Leucoderma** too is benefited by it.

Caution.—(1) Never use arsenic during the inflammatory stage of any cutaneous disease.

(2) Always administer after food and well diluted, except where its local action on the stomach is desired.

(5) Arsenites are more active than arsenates.

(4) As soon as itching, smarting or irritation of the conjunctivæ, œdema of the lower eye-lids, pain in the pit of the stomach or symptoms of neuritis are noticed, the dose must be reduced to one-fourth or one-fifth. If the irritation does not subside, it must be further diminished. Or stopped altogether.

(5) If the skin becomes irritated, a laxative may be given, rather than the treatment be stopped.

(6) For the radical cure of a chronic skin disease, it must be continued for some months after the final disappearance of eruptions.

(7) Children over 5 years of age can bear as large doses as adults.

(8) Old people bear it badly.

Prescribing hints.—Solid arsenic is given in pills, and can be divided as directed in para 12, p. 77. With an alkaline mixture, Fowler's solution should be prescribed, and with an acid one, Liqr. Arsenici Hydrochlor. Sometimes, it is used hypodermically as in multiple sarcomas, but with doubtful benefit.

ACIDUM BENZOICUM. See BENZOINUM.

ACIDUM BORICUM.

Boric Acid. H_3BO_3.

Syn. B.P.—Boracic Acid. Hydrogen Borate.

Source.—Obtained by the purification of native boric acid, or by the interaction of sulphuric acid and borax.

Characters.—Colorless, pearly, lamellar crystals, unctuous to touch, odorless. Taste slightly acid and bitter. *Solubility.*—1 in 30 of cold water, 1 in 3 of boiling water, 1 in 4 of glycerin, 1 in 30 of alcohol (90 p.c.) which burns with a green flame. The *greasy feel* of powdered boric acid is to be noted for its **identification.**

Action.—Antiseptic, diuretic. **B.P. Dose.**—5 to 15 grs.

Official Preparations.

1. **Glycerinum Acidi Borici.**—1 in 16 (by vol). A substitute for Boro-Glyceride. Powerfully antiseptic.
2. **Unguentum Acidi Borici.**—1 in 10. An Antiseptic application.

Non-Official Preparations and Derivatives.

1. **Boric Collyrium.**—2 to 10 grs. to 1 oz.
2. **Boric Gargle.**—10 to 15 grs. to 1 oz.
3. **Boric Dressings.—Boric Gauze.**—20 p. c. **Boric Lint.**—50 p. c. **Boric Lotion.**—1 in 20. **Boric Wool.**—50 p. c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

4. **Boric Pessary.**—10 grs. each.
5. **Boric suppository.**—3 grs. each.
6. **Branalcane.**—A rose colored compound of Boro-glycerin. An antiseptic pigment in diphtheria, and throat, nose and skin affections.
7. **Boro-glyceride.**—A tough deliquescent mass, soluble in water and alcohol, obtained by heating glycerin 92 parts with 62 of boric acid. A patented preparation. Powerfully antiseptic.
8. **Magnesii Boro Citras.**—In white powder or colorless scales. An internal urinary antiseptic. *Dose.*—15 to 30 grs.
9. **Pigmentum Acidi Borici.** *Syn.—Solutio Saturans.*—Boric Acid 1, Ether 3, Alcohol (90 p. c.) 6. Mix. Used in ringworm, &c.

BORAX. Borax.

$Na_2B_4O_7$, $10H_2O$.

Syn. B.P.—Biborate of Sodium. **Syn. I.V.**—*Shohágá.* Beng. Hind.

Source.—A native salt, or obtained by neutralising native boric acid with sodium carbonate, or by boiling native calcium borate with solution of sodium carbonate. (Impure borax is largely imported from Nepal.)

Characters.—Transparent, colorless, odorless, efflorescent crystals, with a weak alkaline reaction. *Solubility.*—1 in 25 of cold water, 1 in 1 of glycerin. It gives a yellow color to the flame.

Incompatibles.—Mineral acids, most metallic salts, mucilage of acacia.

Action.—Antiseptic, emmenagogue, diuretic. **B.P. Dose.**—5 to 20 grs.

Official Preparations.

1. **Glycerinum Boracis.**—1 to 6 or 1 in 8½ by weight. *Dose.*—½ to 1½ dr. An external and internal antiseptic.
2. **Mel Boracis.**—1 in 9½. An antiseptic soothing application to inflamed mucous membrane. Especially useful in "thrush."

Non-official Preparations.

1. **Lotio Boracis.**—Borax 1, Rose-water 24; or Borax 1, Glycerin 1, Rose-water 16. A cosmetic.
2. **Trochisci Boracis, T. H.**—Each contains 3 grs. of borax. Used in thrush.
3. **Tr. Myrrh. et Boracis.**—Myrrh 1, Eau de Cologne 16, Borax 1, Water 3, Syrup 3.

Pharmacology of Boric Acid and Borax.

Externally.—Both boric acid and borax are non-irritating and mild **antiseptics, antiputrefactives,** and **disinfectants.** They kill micro-organisms, but their action is entirely local. Some skins, however, are very sensitive to the action of boric acid, which is apt to produce a troublesome herpes in such cases.

Internally. **Gastro-intestinal tract.**—Some authorities affirm that they prevent the conversion of starch by the saliva, while others deny it. At any rate, they do not check the peptonizing action of gastric and pancreatic secretions, but rather stimulate

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

them slightly. In large doses they retard these processes and act as **gastro-intestinal irritants.**

Urinary tract.—Boric acid is rapidly excreted in the urine, causing increase in the elimination of both water and urea. Small doses increase the acidity of the urine, large doses decrease it. The administration of a few doses often has a marvellous effect in rendering a foul alkaline urine perfectly clean and sweet. It is also **eliminated** by the saliva sweat and fæces.

Nervous system.—Both produce a sedative action on the nervous system.

Generative organs.—Borax promotes menstrual flow and uterine contractions, it is therefore an **emmenagogue** and **ecbolic.**

Toxic action or **Borism.**—Poisoning may occur from absorption. Weakness, dryness of the skin, nausea, vomiting, anorexia, red and inflamed mucous membranes, papular and squamous rashes on the skin, and albumen in the urine are the chief symptoms.

THERAPEUTICS OF BORIC ACID AND BORAX.

Externally.—Boric acid is used as a food preservative. Being a non-irritant, it is largely employed in surgical dressings. The ointment is applied to **wounds, ulcers** and **burns.** As its action is entirely local, its use is of no value in deep suppurating cavities. It is used as an eye-wash in **ophthalmia,** and as an injection in **leucorrhœa, gonorrhœa, ozæna,** (10 grs. to 1 oz.) and **otorrhœa.** The writer plugs the vagina with boric cotton impregnated with boric acid in leucorrhœa, and either injects a saturated warm solution, or insufflates the powder in otorrhœa. In **cystitis,** the irrigation of boric acid (1 in 100) is a capital local application. Thompson's fluid (borax 1 oz., glycerin 2 ozs., and water 2 ozs.) in ½ to 4 ozs. of warm water is also very serviceable in **cystitis. Pityriasis** of the body and scalp, **eczema** of the ear and scalp, and **cracked nipples** are benefited by boric acid applications. Borax (1 dr. to water 4 ozs.) removes **prurigo** of the labia and anus. The wearing of socks soaked in a warm saturated solution of borax removes the smell of **fetid perspiration of the feet.**

Internally.—Borax is used as a gargle in **mercurial salivation,** and **aphthous sores** of the mouth. Borax tablets slowly dissolved in the mouth reduce **hoarseness.** Borated tincture of myrrh is a valuable local paint for **ulcerated gums.** Glycerin boracis 1 dr., tr. myrrh 10 ms. and water to 1 oz., make a good all-round mouth-wash. Borax is an excellent medicine for **fermentative dyspepsia,** and for disinfecting foul urine. Its efficacy in **diarrhœa** and **dysentery** is doubtful. To clear putrid ammoniacal urine, boric acid is superior to borax, three or four 15 gr. doses rendering it quite clear. Borax is sometimes employed to increase the labor-pains, or to expel the placenta.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Prescribing hints.—The taste is disguised by the syrup of orange peel. The powder may be given in cachets or solution. Borax should not be combined with cocaine or other alkaloids.

ACIDUM CARBOLICUM.

Carbolic Acid. C_6H_5OH.

Syn. B.P.—Phenol, Phenic Acid, Phenyl Hydrate, Phenyl Alcohol.

Source.—Obtained from coal-tar oil by fractional distillation and purification.

Characters.—Colorless, acicular, deliquescent crystals, becoming pinkish when exposed to moist air; odor tarry; taste sweetish, pungent; melts at 102° F.; sp. gr. 1·060 to 1·066. *Solubility.*—1 in 30 to 40 of water, freely in glycerin, ether, chloroform, fixed and volatile oils, and alcohol. Does not redden blue litmus paper immediately; coagulates albumen. *Impurities.*—Aurin or rosalic acid, which gives it a purplish color when exposed, and cresol which gives turbidity to water.

Identification.—By its *peculiar odor.*

Incompatibles.—Chloral, Ferrous Sulphate.

Action.—Antiseptic, disinfectant, deodorant, local anæsthetic, and caustic.

B.P. Dose.—1 to 3 grs. in pill or mixture.

Enters into.—Inject. Ergot. Hypoderm., Liq. Thyroid., and the

Official Preparations.

1. **Acidum Carbolicum Liquefactum.**—Phenol 10, water 1. A colorless liquid becoming pinkish afterwards. **B.P. Dose.**—1 to 3 ms.
2. **Glycerinum Acidi Carbolici.**—1 in 5 by vol.
3. **Suppositoria Acidi Carbolici.**—1 gr. in each.
4. **Trochiscus Acidi Carbolici.**—1 gr. in each. *Dose.*—1 to 3.
5. **Unguentum Acidi Carbolici.**—1 in 25.

Non-official Preparations and Derivatives.

1. **Carbolic Lotion.**—1 to 2 in 40. 2. **Carbolised Oil.**—1 to 9 or more. 3. **Catheter Oil.**—Phenol 1, Castor Oil 4, Almond Oil 15. 4. **Hypodermic injection.**—2 p.c. solution. 5. **Deep hypodermic injection.**—½ gr. in 20 ms. of water, in poisoned wounds or erysipelas. 6. **Spray.**—3 grs. to 1 oz. 7. **Inhalation.**—20 grs. in 1 pint. 8. **Antiseptic Carbolic Dressings.**—**Carbolised Wool, Lint, Tow.**—5 to 10 p.c. **Ligatures.**—16 p.c. **Carbolic Gauze** (Lister's).—Phenol 1, Rasin 4, Paraffin 4. **Carbolic Soap.**—20 p.c.

9. **Pilula Acidi Carbolici.**—Carbolic Acid 60 grs., Hard Paraffin 12 grs., Wheaten Flour 45 grs., Glucanth 3 grs. Divide in 60 pills. (See p. 88).

10. **Pigmentum Antisepticum** (Sir A. Clark).—Glycerin. Acid Carbolic 1 oz., Quin. Hydrochloride 60 grs., Mercuric Chloride ½ gr. For application to the nasal passage and pharynx in hay fever.

11. **Carbolised Smelling Salts.**—Carbolic acid 24, Ammon. Carb. 16, Liq. Ammon Fort. 44, Ol. Lavend 1½, Camphor 3, Pine Sawdust *q. s.* In coryza, influenza or hay fever.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

12. **Phenol Camphor.**—Carbolic Acid 1, Camphor 3. As a local anæsthetic for toothache, and as a pigment in diphtheria alone or diluted with almond oil.

13. **Phenol Iodatum.** *Syn.—Iodized Phenol.*—Iodine 1, Liquefied Carbolic Acid 4. Caustic and alterative. In endometritis, abrasions and granular condition of the cervix, ringworm on the scalp and body.

14. **Bromol.** *Syn.—Tribromophenol.*—A white, crystalline, insoluble salt prepared by mixing a solution of carbolic acid with bromine water. A powerful antiseptic and caustic. Internally, an intestinal disinfectant in typhoid fever and diarrhœa. *Dose.*—½ to 1½ grs.

15. **Bromo-phenol.** *Syn.—Ortho-monobromphenol.*—A violet colored liquid. A 2 p.c. ointment in erysipelas.

16. **Chlorphenol.** *Syn.—Para-monochlorphenol.*—A powerful antiseptic crystalline salt. Has given brilliant results in erysipelas by the application of an ointment (10 grs. to 1 oz.), and in tubercular ulcerations in the larynx and throat by a 5 to 20 p.c. solution in glycerin.

17. **Acidum Trichlorphenicum.** *Syn.—Trichlorphenol.*—Insoluble acicular crystals, forming soluble salts with alkaline bases. 25 times stronger than carbolic acid.

18. **Aseptol.** *Syn.—Sulphocarbolic acid, Sulpho-carbol, Sozolic acid, Phenol sulphonic acid.*—A syrupy soluble liquid, resembling salicylic and carbolic acids in action. A 5 p.c. solution is used in abdominal surgery. A delicate test for albumen and bile in the unine.

19. **Sozal** is an *Aluminium salt of para phenol sulphonic acid.* Pale, reddish-brown, soluble, antiseptic. *Dose.*—3 to 8 grs.

PHARMACOLOGY.

Externally.—Outside the body, carbolic acid arrests the life-processes of the lower organisms both vegetable and animal, and is a powerful **parasiticide.** It destroys also the properties of **organised ferments,** as yeast, moulds and bacteria, and prevents the zymosis of septic germs, as *anthrax bacilli.* Hence, it is an **antizymotic,** and **disinfectant,** though not so powerful as corrosive sublimate. It is said that a 5 p.c. solution kills the plague bacillus. Unorganised or chemical ferments (*enzymes*), such as pepsin, ptyalin are not so readily affected by it, except in very large doses. As it prevents decomposition, and generation of foul-smelling gases, it is an **antiseptic** and **deodorant.**

Applied to the skin, it causes a temporary burning followed by anæsthesia. Stronger applications act as a caustic, with the formation of a **white eschar** without vesication. Hence, it is a local **irritant, anæsthetic** and **escharotic.**

Internally. **Gastro-intestinal canal.**—In a concentrated form, carbolic acid has a similar action on the mucous membrane of the mouth, fauces, œsophagus and stomach, as on the skin. It is a powerful **gastro-intestinal irritant.** It is readily absorbed, and is probably converted into a sulphocarbolate in the stomach. It cannot influence the enzymes unless given in large doses.

Blood and circulation.—It is readily absorbed from the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

unbroken skin, wounded surfaces, mucous tracts, and subcutaneous tissues. In what form it exists in the plasma is not known, probably as an alkaline carbolate. In moderately large doses, it first stimulates then paralyses the **vasomotor centre**, thereby first increasing the blood-pressure and pulse-beat, and afterwards diminishing them. Cardiac action is not affected until very large doses are given, when it is depressed.

Respiration.—No effect is seen in small doses, but large doses first stimulate then paralyse the **respiratory centre.**

Temperature.—No effect is produced by medicinal doses, but large ones lower it.

Nervous system.—In fairly large doses, it affects the medulla and cerebrum. Its influence on the respiratory, cardiac and vasomotor centres has already been referred to. It also stimulates the **salivary** and **sweat centres**, producing **salivation** and **perspiration.** The cells of the anterior cornua are first stimulated then paralysed, the result being convulsions followed by paralysis. Poisonous doses produce headache, giddiness, contracted pupils and finally coma.

Urine.—Carbolic acid is chiefly excreted by the urine, in the form of sulphocarbolates, glycuronic acid, pyrocatechin and hydroquinone. Pyrocatechin being a dark colored body, gives it a **dark or olive-green color**, but this cannot be the sole cause. Sometimes albumen is detected *In poisoning* by the acid, *the normal sulphates disappear from the urine.* The urine in these cases resists decomposition for a considerable time.

Elimination.—By the saliva, sweat, respiratory and gastro-intestinal secretions and urine. A portion of it is lost in the body probably converted into oxalates and carbonates.

Acute toxic action.—If swallowed in a concentrated form, the patient feels intense burning pain in the mouth, fauces and stomach, with the formation of white eschars in the mouth, &c. He soon becomes collapsed with a cold clammy sweat, subnormal temperature, weak, feeble pulse and shallow laboured breathing, heart and respiration stopping almost simultaneously. Reflex Excitability is lost and convulsions occasionally set in. Urine becomes dark-green, and finally the patient becomes insensible and comatose. The *post mortem* reveals hard, white eschars in the mouth, œsophagus and stomach, with or without inflammatory redness. Blood dark and its coagulability diminished.

Antidotes.—Pump, emetics. Soluble sulphates, such as magnesium sulphate 1 oz. or sodium sulphate ½ oz. in 8 ozs. of water at once. If no time can be spared, sodium sulphate should be injected hypodermically or into the peritoneum, in order to *counteract the effect of the poison in the blood, for the soluble sulphates combine readily with the acid.* Magnesium sulphate should not be injected. Chalk, saccharated lime, egg-albumen, oils, demulcents, stimulants, hot water bottles, strychnine hypodermically, &c., are useful adjuvants. Repeated washing of the stomach with glycerin has been found efficacious by Whitla.

Chronic toxic action.—The following symptoms have been observ-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ed by the writer in a case, where a deep suppurating cavity in a scrotal elephantiasis was plugged with carbolic acid dressings,—headache, anorexia, gastro-intestinal disturbance, insomnia, fever, dark urine.

Caution.—Green or smoky urine is often the first warning, but in a doubtful case the urine should be examined to ascertain the presence or absence of ordinary sulphates. The products of carbolic acid in the urine can be detected by distilling the urine, and adding bromine water to the distillate, when white crystalline sulphocarbolate precipitates.

THERAPEUTICS.

Externally.—Crude carbolic acid or phenyle is employed to disinfect, and remove the foul odors of water-closets, drains, dissecting rooms, hospital-wards, bed pans, spittoons, &c. A sheet moistened with a solution (1 in 40), and hung at the doorway of a sick-room disinfects the air, but it is doubtful whether it can act as a germicide. For small operations, as for instance, puncturing the skin with a hypodermic needle, carbolic acid may be applied to produce local anæsthesia. To stimulate **indolent sores**, to prevent the foul smells of **gangrenous ulcers**, to destroy **exuberant granulations**, **condylomas**, and the **poison of poisoned wounds**, the application of undiluted carbolic acid is most valuable. A 20 or 40 p.c. solution allays the **itching of urticaria** and **eczema**. Glycerin. Acid Carbolic, is an effective remedy for **ringworm**, **favus**, and **tinea versicolor**. According to Whitla, a deep hypodermic injection (½ gr. to 20 ms. of water) has been found useful in **synovitis**, **glandular** and **joint swellings**, **erysipelas**, **poisoned wounds** and deep inflammations. To wash surgeons' hands, instruments, sponges, linen, and the parts to be operated upon, carbolised lotions are daily used in surgical practice. ½ gr. in water 5 ms. removes **piles** when injected. It is doubtful whether its inhalation is of any service in **phthisis**, **gangrene** of the lungs and **chronic bronchitis**. The pain of **anal fissures** and **ulcers** is relieved by the application of liquefied carbolic acid. The application of Phenol Camphor or Iodized Phenol, relieves **excoriation** and **ulceration** of the **os** and **cervix**, and **chronic endometritis**. A vaginal douche (1 in 80 or 100) is beneficial in **leucorrhœa**, **uterine ulcers**, and **cancer**, but it sometimes causes itching and irritation.

Internally.—A pellet of cotton wool dipped in melted anhydrous carbolic acid, and put into the cavity of the **carious tooth**, and covered by an extra pellet to protect the soft parts, relieves **toothache**. For **ulcerative** and **aphthous stomatitis**, **follicular tonsillitis** and **diphtheria**, a solution (glycerin. acid-carbolic. 15 to 20 ms. in water 1 oz.) makes an excellent gargle. In **hay asthma**, Pigmentum Antisepticum is a useful local application to the nares and pharynx. Some physicians use carbolic acid in **malarious** fevers, but the writer doubts its efficacy.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

As an intestinal antiseptic, carbolic acid has been employed in **enteric fever, sloughing dysentery, acute and chronic diarrhœa** but with doubtful results.

Prescribing hints.—Best given in pill-form. The pills must be coated with keratin or varnished with salol, if intended for action on the intestine. When given in a mixture, it should be well diluted and combined with glycerin and peppermint water.

ACIDUM CHROMICUM.

Chromic Anhydride. CrO_3.

Source.—Produced by the interaction of sulphuric acid, and potassium bichromate.

Characters.—Crimson, acicular, deliquescent, crystals. *Solubility.*—Freely in water. Decomposed by alcohol.

Action.—Powerfully corrosive, disinfectant and antiseptic.

Official Preparation.

1. **Liquor acidi Chromici.**—1 in 4. Caustic.

Pharmacology.

Externally.—It is a powerful **oxidising agent,** destroying the lower organisms, and is therefore a **deodorant** and **disinfectant.** It coagulates albumen and oxidises organic substances, and therefore acts as a **caustic.**

Therapeutics.

Externally.—Liquor Acidi Chromici is used for destroying **warts, condylomata, lupus, cystic goitre,** and other small **cystic tumors.** It should be applied with a pointed glass rod, the adjacent parts being protected by a plaster or ointment, and a piece of wet lint kept ready to absorb any superfluous acid. A lotion (10 grs. to 1 oz.) has a decided good effect on **syphilides, psoriasis** and **nodules** on the tongue. **Ranula** and **lingual epithelioma** require the application of a more concentrated solution (1 to 2), which should be washed off after a few minutes with aluminium acetate solution. A weak lotion (1 in 40 or more) is useful for **ulcerated gums** and **foul sores**; and as an injection (1 in 2000 to 4000) in **gonorrhœa** and **leucorrhœa.** A 3 per cent. solution checks perspiration of the feet.

Chromic acid solution does not burn or stain linen, and is a delicate test for albumen in the urine.

Prescribing hints.—It should not be mixed with glycerin or alcohol as the mixture is likely to explode (see p. 109).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ACIDUM CITRICUM. Citric Acid.

Hydrogen Citrate. $C_3H_4 \cdot OH \cdot (COOH)_3$, H_2O.

Source.—Prepared from the juice of the fruit of various species of *Citrus*.

Characters.—Colorless, trimetric prisms; taste acid. *Solubility.*—4 in 3 of cold and 2 in 1 of boiling water. *Impurities.*—Copper, lead, iron, calcium, sulphuric and tartaric acids.

Incompatibles.—Alkaline carbonates, potassium tartrate, and acetates.

Enters into.—Succus Limonis (17½ grs. in ½ oz.), Syr. Limonis, Sod. Phosph. Effer., Sod. Sulph. Effer., Mag. Sulph. Effer., Lith. Citras Effer., Liq. Ammon. Citratis. All these contain free citric acid.

20 grs. of Citric Acid in 1 oz. of water } will neutralise { 30 grs. of Pot. Bicarb. / 24 grs. of Sod. Bicarb. / 17 grs. of Ammon. Carb. / 13 grs. Mag. Carb.

Action.—Refrigerant, antiscorbutic. **B.P. Dose.**—5 to 20 grs. in water.

ACIDUM TARTARICUM.

Tartaric Acid. $C_4H_6O_6$.

Source.—Prepared from potassium tartrate.

Characters.—Colorless, monoclinic prisms; taste acid. *Solubility.*—1 to 8 of water, 1 in 2½ of alcohol (90 p.c.). *Impurities.*—Iron, lead, copper, calcium, tartrate of potassium, oxalic acid, arsenium, &c.

Incompatibles.—Salts of calcium, potassium, lead, mercury, alkaline carbonates and vegetable astringents.

Enters into.—Mag. Sulph. Effer., Sod. Sulph. Effer., Sod. Phosh. Effer., Pulv. Sod. Tart. Effer., Lith. Citras Effer. and Pil. Quin. Sulph.

Dispensing hints.—Both citric and tartaric acids should be weighed in a dry glass pan, and preserved in a tightly stoppered bottle, otherwise they will deliquesce.

20 gr. of Tartaric acid in 1 oz. of water } will neutralise { 27 grs. of Potas. Bicarb. / 22 grs. of Sodium Bicarb. / 15½ grs. of Ammon. Carb.

SUCCUS LIMONIS.

Lemon Juice. N.O. *Rutaceæ*.

Syn I. V.—*Nembu-ras*, Beng. *Nembúka árak*, Hind.

Habitat.—West Indies, Southern Europe, India.

Source.—Freshly expressed juice of the ripe fruit of *Citrus Medica*, ver. *β. Limonum*.

Characters.—Slightly turbid; yellowish, sp. gr. 1·030 to 1·040 1fl. oz. contains 30 to 40 grs. or on an average 35 grs. of citric acid.

Composition.—Citric acid free and combined, malic acid, phosphoric acid, &c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

110 ms. of the juice are neutralised by 11½ grs. of $KHCO_3$, 9½ grs. of $NaHCO_3$, and 16½ grs. of Na_2CO_3.

Action.—Refrigerant, antiscorbutic. *Dose.*—1 to 2 ozs.

Enters into.—The preparation of Citric Acid and the

Official Preparation.

1. **Syrupus Limonis.**—1 in 2. **B.P. Dose.**—½ to 1 dr.

Pharmacology of Citric Acid, Tartaric Acid and Lemon Juice.

Externally.—They have no action on the unbroken skin, but cause irritation and pain when applied to an abraded surface.

Internally. **Mouth.**—Like all acids, they stimulate the salivery secretion and thereby allay thirst.

Stomach.—Free acids unite with bases to form neutral salts. When given in an effervescing form, the liberated **carbonic acid gas** acts as a **gastric sedative.**

Blood.—The neutral salts formed in the stomach are **deoxidised** in the blood after absorption. For instance, potassium citrate becomes decomposed into potassium carbonate, carbonic acid and water, thus $2(C_3H_4.OH(COOK)_3)+O_{18}$ (from blood) $=3(K_2CO_3)+9CO_2+5H_2O$, thereby **increasing the alkalinity** of the plasma. If these acids are given in large doses, a portion remains unoxidised and thus *diminishes* the alkalinity, and as a consequence thereof, somewhat checks metabolic exchanges between the blood and the tissues.

Urine.—They are excreted as carbonates, except in large doses, when they escape partly unchanged. Hence, in medicinal doses, they increase the **alkalinity of the urine.**

Therapeutics of Citric Acid, Tartaric Acid and Lemon Juice.

Internally.—As a refrigerant drink *e.g.* lemonade, they are given to allay thirst in **fevers.** The sucking of a lemon is refreshing in dryness of the mouth. Carbonic acid—the product of an effervescing mixture checks **nausea** and **vomiting.** Citrates and tartrates are useful in promoting the absorption of **uric acid** deposits. Lemon juice and citric acid are specifics for **scurvy** and **scurvy rickets.** Some authors say that the best form for administration in this disease is the sodium citrate and not the potassium salt. Some assert that lime juice (½ to 1 pint) is serviceable in **acute rheumatism.** Some think it useful in malarious fevers. In our days, citric and tartaric acids are chiefly used for their remote effects, and for making effervescing draughts and preparations.

Prescribing hints.—For causing the absorption of small uric acid calculi, you should order 40 to 60 grs. of citrate of potash

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

to be dissolved in 4 oz. of water and taken every 4 hours. If more than this is given, an insoluble biurate may form on the surface of the stone.

With some patient you will find it best to give the full dose in a tumbler of water at bed time, so as to counteract the excessive acidity of the urine passed during the night.

ACIDUM GALLICUM. See GALLA.

ACIDUM HYDROBROMICUM DILUTUM.

Diluted Hydrobromic Acid. HBr.

Source.—An aqueous solution containing 10 p.c. by weight of hydrogen bromide, obtained by the distillation of potassium bromide with concentrated phosphoric acid.

Characters.—A colorless, inodorous liquid; taste and reaction acid; sp. gr. 1·077. *Impurities.*—Arsenic, barium, chlorides, phosphates, sulphates or sulphites.

Dispensing hints.—Should be kept in the dark. Commercial acid becomes coloured by keeping.

Action.—Sedative, hypnotic. **B.P. Dose.**—15 to 60 ms. (60 ms. = 10 grs, of potassium bromide.)

Non-Official Preparation.

1. **Acidum Hydrobromicum Concentratum.**—1 in 3 of distilled water makes the official diluted acid.

Pharmacology and Therapeutics.

Internally—Diluted Hydrobromic acid has the same action as that of the bromides, but is not so reliable. It is chiefly used in combination with quinine to prevent cinchonism, and sometimes, with morphine to prevent its after-effects. It neither gives rise to acne, nor is it so depressant as bromides. The writer often combines it with quinine, when he administers large doses.

Prescribing hints.—Large doses (2 to 4 drs.) may be given freely diluted or with syrup and water. 2 ms. of the dilute acid should be prescribed for each grain of quinine ordered.

ACIDUM HYDROCHLORICUM.

Hydrochloric Acid. HCl.

Syn.—Muriatic acid. Spirits of salt.

Source.—Obtained by dissolving in water the gas produced by the interaction of sulphuric acid and sodium chloride, containing 31·79 p.c. of hydrogen chloride by weight.

Characters.—A *colorless*, strongly acid liquid, emitting white fumes; sp. gr. 1·160. *Impurities.*—Sulphurous and sulphuric acids, arsenic, copper, lead, iron, aluminium, bromides, iodides, free chlorine.

Incompatibles.—Lead, silver and mercurous salts, tartar emetic, alkalis and their carbonates.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Action.—Powerfully escharotic.

Enters into.—The preparation of Acid. Nitro-hydrochloric dil., Apomorph. Hydrochlor., Cocaine Hydrochlor., Glyc. Pepsini, Liq. Arsen. Hydrochlor., Liq. Ferri Perchlor. Fort., Liq. Zinc. Chlor., Podophyl. Resin., many chlorides, and the.

Official Preparation.

1. **Acidum Hydrochloricum Dilutum.**—Contains 10·58 p.c. of hydrogen chloride. **B.P. Dose.**—5 to 20 ms. diluted.

Enters into.—The preparation of Ext. Ergot., Inj. Apomorph. Hyp., and Liq. Morph. Hydrochlor.

Pharmacology and Therapeutics.

Internally.—Being the normal acid of the gastric juice, it is given *after meals* in all cases where dyspeptic symptoms are due to achlorhydria, and *before meals* in all cases of hyperchlorhydria. It is also employed to reduce the alkalinity of urine in phosphatic deposits, and to stimulate the hepatic action.

ACIDUM NITRICUM.

Nitric Acid. HNO_3.

Source.—Prepared by the interaction of sulphuric acid and potassium and sodium nitrate; containing 70 p.c. of hydrogen nitrate.

Characters.—A *clear, colorless*, acid liquid emitting corrosive fumes; sp. gr. 1·42. *Impurities.*—Lead, copper, iron, arsenic, chlorides, bromates, iodates, sulphates.

Incompatibles.—Alkalis, alcohol, carbonates, oxides, sulphates, lead acetate, ferrous sulphate.

Action.—Powerfully corrosive.

Enters into.—The preparation of Acid Phosph. Con., Argent. Nitras, Liq. Ferri Perchlor. Fort., Liq. Ferri Pernit. Fort., Liq Ferri Persulph., Liq. Hydrarg. Nit. Acid., Spt. Æther. Nitros., Ung. Hydrarg. Nit., and the

Official Preparations.

1. **Acidum Nitricum Dilutum.**—1 in $5\frac{1}{8}$ or 17·44 p.c. of hydrogen nitrate. **B.P. Dose.**—5 to 20 ms. (5 ms. contain 1 m. of HNO_3).

2. **Acidum Nitro-Hydrochloricum Dilutum.**—$\frac{1}{4}$ and 1 in 8. (16 ms. contain $1\frac{1}{2}$ ms. of nitric and 2 ms. of hydrochloric acid). *Composition.*—Free chlorine, hydrochloric, nitric and nitrous acids. It should be set aside for 14 days before use. **B.P. Dose.**—5 to 20 ms. diluted.

Non-official Preparation.

1. **Acidum Picricum.** *Syn.—Carbazotic Acid.*—Formed by dropping Phenol into fuming Nitric Acid. Yellow, shining laminar or acicular crystals. Cotton wool, impregnated into a saturated solution of picric

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

acid, has recently been extensively used for burns. The wounds heal readily under the artificial scab formed, but there is danger of toxic absorption and several cases of peripheral neuritis are on record as the result of this treatment.

Pharmacology and Therapeutics.

Externally.—Strong nitric acid is often employed to destroy **chancre, warts, hæmorrhoids, phagedænic sores** and the poison of venomous snakes and rabid dogs. Nitro-hydrochloric acid baths (see p. 65) are useful in **chronic hepatic congestion.**

Internaliy.—Both the diluted nitric acid and nitro-hydrochloric acids are **sialagogues, gastric tonics** and **hepatic stimulants,** and are largely employed in **dyspepsia, torpidity of the liver** and **catarrhal jaundice.** They are sometimes given in **infantile diarrhœa** on account of their **feeble astringent** property, and in **chronic bronchitis** when the secretion is profuse. Where mercury is not well borne, nitric acid is sometimes given in **syphilis.** It is beneficial in **mercurial** and other forms of **stomatitis.** When injected into the bladder it is occasionaly useful in promoting the solution of Phosphatic deposit.

ACIDUM PHOSPHORICUM CONCENTRATUM.

Concentrated Phosphoric Acid. H_3PO_4.

Source.—Prepared by treating, with water and nitric acid, the residue left after burning phosphorus in air ; containing 66·3 p.c. of hydrogen orthophosphate.

Characters.—A colorless, *syrupy* liquid ; taste and reaction acid ; sp. gr. 1·5. *Impurities.*—Lead, copper, arsenic, sulphuric, nitric, hydrochloric, phosphorus, pyro and metaphosphoric acids, silica.

Incompatibles.—Sodium carbonate, calcium salts.

Action.—Caustic.

Enters into.—The preparation of Acid Hydrobrom. Dil., Ammon-Phosph., Syr. Calcis Lactophosph., Syr. Ferri Phosph., Syr. Ferri Phosph. c. Quin. et Strych. and the

Official Preparation.

1. **Acidum Phosphoricum Dilutum.**—3 in 20, or 13·8 p. c. **B.P. Dose.**—5 to 20 ms.

Pharmacology and Therapeutics.

Internally.—The diluted acid is a **refrigerant and gastric tonic.** It does not derange the digestion. It makes an agreeable drink in **diabetes** and **febrile diseases.** By some it is considered serviceable in cases of **phosphatic diathesis.** It is a mistake to ascribe the therapeutic virtues of free phosphorus to the acid.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ACIDUM SULPHURICUM.

Sulphuric Acid. H_2SO_4.

Source.—Obtained by the combustion of sulphur or pyrites and the oxidation and hydration of the resulting sulphurous anhydride by means of nitrous and aqueous vapors.

Characters.—A *colorless*, corrosive, *oily*, acid liquid, evolving heat when water added. Sp. gr. 1·843. *Impurities.*—Lead, copper, iron, arsenic, selenium, ammonium, carbonaceous matters and other acids.

Incompatibles.—Alkalis and their carbonates, calcium and lead salts.

Action.—Powerfully corrosive.

Enters into.—The preparation of many mineral acids, ethers, sulphates, Inf. Rosæ Acidum, and the

Official Preparations.

1. **Acidum Sulphuricum Aromaticum.** *Syn.*—*Elixir of Vitriol.* —1 in 14 or 13·8 p.c. of hydrogen sulphate. **B.P. Dose.**—5 to 20 ms.

2. **Acidum Sulphuricum Dilutum.**—1 in 12 nearly. In making this preparation, remember that the acid must be added to the water; not the water to the acid. **B.P. Dose.**—5 to 20 ms.

Pharmacology and Therapeutics.

Externally.—Concentrated sulphuric acid has a strong affinity for water, charring and desiccating the parts with which it comes in contact. It is therefore a most powerful **caustic.**

Internally.—The concentrated form is a violent irritant and caustic. Freely diluted, it may be given to **allay thirst** in **cholera** and **hæmorrhage.** Being a powerful **gastro-intestinal astringent,** it is successfully employed in **diarrhœa, cholera** and **gastro-intestinal hæmorrhage.** It is eliminated by the kidneys and bowels in the form of a sulphate. It prevents the absorption of lead and for that reason lemonade made with sulphuric acid is largely used by workers in lead as a prophylactic against Plumbism.

In combination with Zinc Sulphate, it checks the night-sweats of Phthisis.

Geneneral Pharmacology of Hydrochloric, Nitric, Phosphoric and Sulphuric acids.

Externally.—All are **irritants** and **corrosives** in a concentrated form. Diluted solutions are local **astringents** and **styptics.** Still more diluted, they are **external refrigerants** and **anhydrotics.** All mineral acids are **disinfectants.**

Internally. **Gastro-intestinal tract.**—They stimulate the secretion of the alkaline **saliva** and thus **allay thirst.** In the stomach they neutralise free alkali and form neutral salts, which

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

are probably absorbed as such. Given before food, they retard the flow of the acid secretion—gastric juice; and with or after food, they promote that of the alkaline secretions of the liver, pancreas and intestinal glands. Nitric and nitro-hydrochloric acids act also as powerful **hepatic stimulants** and **cholagogues.** Diluted acids, especially sulphuric, have an **astringent** action on the intestines.

Blood.—They circulate in the blood as neutral salts, and render the *blood less alkaline but never acid.* Hydrochloric acid increases the number of red blood corpuscles in **chlorosis**, but does not affect the hæmoglobin.

Kidneys.—They do not increase the **free acidity of urine** to any appreciable extent. Nitric acid is partly converted, into ammonia and tends to increase the alkalinity of urine.

Acute toxic action.—All these acids are **irritant poisons.** If swallowed in a concentrated form, intense burning pains extending from the mouth to the stomach, excoriation and formation of gray or yellowish eschars in the mouth, severe abdominal pain and tenderness, vomiting of coffee colored matters containing dark clots of blood and shreds of mucus, constipation, or if bowels are open, stools dark from the admixture of blood, are the prominent symptoms. Dyspnœa due to laryngeal swelling either from irritant fumes or from the introduction of some of the acid is not infrequent. Collapse with cold perspiration soon set in and the patient dies.

Antidotes.—No pump. Alkalis, such as soda, lime water, soap water, magnesia in a moderately diluted solution at once. Demulcents as egg albumen, bland oils, linseed tea, &c. Morphine subcutaneously to relieve pain, ether, brandy, &c., as stimulants.

Chronic toxic action.—General emaciation, languor, catarrhal inflammation of the gastro-intestinal canal, anorexia and anæmia are the chief symptoms.

ACIDUM HYDROCYANICUM DILUTUM.

Diluted Hydrocyanic Acid. HCN.

Syn.—Diluted Hydrogen Cyanide. Prussic Acid.

Source.—An aqueous solution containing 2 p.c. of hydrogen cyanide by weight, prepared by the interaction of diluted sulphuric acid and potassium ferrocyanide; thus, $2K_4Fe(CN)_6+6H_2SO_4=6HCN+Fe_2K_2(CN)_6+6KHSO_4$.

Characters.—A colorless, volatile liquid with a peculiar odor; sp. gr. 0·997. *Impurities.*—Sulphates and chlorides.

Identification.—Its peculiar almond-like odor helps recognition. Its vepor in large quantities is poisonous.

Incompatibles.—Copper, iron and silver salts, red mercuric oxide and sulphides.

Dispensing hints.—It should be stocked in small, blue, stoppered bottles which are tied over and inverted, in a cool, dark place. If its color becomes brown it is unfit for use. Extemporaneously it can be prepared, if necessary, by mixing silver cyanide 6, diluted hydrochloric

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

acid B.P. 15, distilled water 45, by shaking and filtering. Product = 2 p.c. of HCN.

Action.—A most rapid, deadly poison. Sedative, antispasmodic.

B.P. Dose.—2 to 6 ms. *Daily dose.*—10 ms.

Enters into.—Tr. Chloroform. et Mprph. Co., Aq. Laurocerasi, Amygdala Amara and Prunum Virg. also contain it.

Non-Official Preparations.

1. **Acidum Hydrocyanicum** (Scheele) **B.P.C.**—Contains 4 p.c. of HCN. *Dose.*—1 to 4 ms.

2. **Vapor Acidi Hydrocyanici. B.P. 1885.**—10 to 15 ms. in water 1 dr.

Pharmacology.

Externally.—It is a protoplasmic poison. It is absorbed from the epidermis, but more readily from a raw surface. It paralyses the periphery of the sensory nerves, and thus acts as a **local sedative** and **anæsthetic.**

Internally. **Alimentary canal.**—It is also absorbed rapidly by the mucous membrane, and has the same action on the mouth and stomach as on the skin. It is therefore a powerful **gastric sedative.**

Blood.—It quickly enters the blood from all parts of the body. If death is immediate, the **venous blood** is found **bright scarlet,** due possibly either to the arrest of the oxygenation of hæmoglobin, or according to Brunton, to the rapid flow of blood through the dilated peripheral blood-vessels without undergoing the usual changes. But, if death is delayed even for a few minutes, the blood becomes **dark, purple** owing to the conversion of oxygen into carbonic acid, most probably from asphyxia due to the paralysis of the respiratory centre.

Heart and blood vessels.—A large dose at once arrests the heart in diastole. This result is due to direct action in the **cardiac centre,** and the nervo-muscular apparatus of the heart, for it has been observed that hydrocyanic acid stops the heart's action even when topically applied. A small dose stimulates the **vagal centre, and slows the pulse. The blood pressure** is first momentarily **heightened** and afterwards **deeply lowered** from a transitory stimulation and subsequent paralysis of the **vasomotor centre.**

Respiration.—As a rule, the **respiratory centre is paralysed** after a brief stimulation. Respiration becomes feeble and laboured, and death takes place from asphyxia, except in those cases where the heart is instantly stopped by a large dose.

Brain.—Medicinal doses have no action. Large doses cause **insensibility** and **coma,** referable either to the direct action of the drug on the cerebrum, or to the altered condition of blood from asphyxia. **Pupils are dilated.** Convulsions do not occur in man, but are common in animals.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Medulla and cord.—It is a paralyser of the respiratory, cardiac, and vaso-motor centres. The reflex excitability of the cord is first lowered and then abolished altogether. The peripheral sensory nerves are less affected by internal administration, than by local application. The motor nerves and muscles are also paralysed

Elimination.—Hydrocyanic acid is rapidly excreted, chiefly by the breath. A portion is supposed to be eliminated as formate of ammonia.

Acute toxic action.—If the dose be large, death is instantaneous. But, with a smaller dose, the patient becomes unconscious; his eyes fixed; pupils dilated; pulse feeble, and irregular or imperceptible; respiration slow, deep and convulsive with frothing at the mouth; skin cold and clammy and at last death occurs. At the *post mortem* are found the odor of hydrocyanic acid, lividity of the surface, clenched fingers, firmly closed jaws, froth at the mouth, fixed and glistening eyes, dilated pupils, dark blood, and slightly congested stomach.

Antidotes.—Emetics or pump if possible. Fresh air, cold and hot affusion alternately to the head, artificial respiration, diffusible stimulants, oxygen and ammonia inhalation and electricity. Atropine and strychnine hypodermically. Protosalts of iron are chemical antidotes.

THERAPEUTICS.

Externally.—Dilute hydrocyanic acid removes the itching of **urticaria, lichen** and **dry eczema**, when the affected parts are bathed or sponged with a lotion (2 drs. to 8 ozs. of rose water and glycerin). For the same purpose, an ointment (½ dr. to 1 oz.) may be used. Care should always be taken not to apply the ointment or lotion to a raw surface.

Internally—For **irritative gastric disorders** and **dyspepsia** it is ordinarily prescribed with sodium bicarbonate, bismuth and gentian. It allays the **hacking cough** of phthisis, and the spasms of **asthma, pertussis** and **hiccough**. It checks palpitation and cardiac distress caused by dyspepsia.

Prescribing hints.—Dilute hydrocyanic acid may be combined with sodium bicarbonate (see p. 108) and given either as an effervescing draught or in an almond emulsion.

ACIDUM LACTICUM.

Lactic Acid. Hydrogen Lactate. $CH_3 \cdot CHOH \cdot COOH$.

Source.—May be obtained from the fermentation of lactose, containing 75 p.c. of hydrogen lactate.

Characters.—A colorless, syrupy liquid; sp. gr. 1·21. *Solubility.*—Freely in water, alcohol and ether. *Impurities.*—Mineral and other acids, sugar, lead, &c.

Action.—A solvent of diphtheritic false membranes.

OFFICIAL PREPARATION.

1. **Syrupus Calcii Lactophosphatis.—B.P. Dose—½ to 1 dr.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-official Preparations and Derivatives.

1. **Acidum Lacticum Dilutum.** B. P. 1885—Lactic acid 3 ozs., distilled water to 1 pint. *Dose.*—½ to 1 dr.
2. **Nebula Acidi Lactici,** T.H.—Lactic acid 1, Distilled Water 15.
3. **Calcii Lactas.**—*Dose.*—1 to 5 grs.
4. **Ferri Lactas.**—*Dose.*—2 to 10 grs.
5. **Syrupus Calcii et Ferri Lactophosphatum.**—*Dose.*—½ to 1 dr.

Pharmacology and Therapeutics.

Externally.—The concentrated acid is **corrosive** and is used alone or in the form of a paste with kaolin to destroy **lupus.**

Internally.—A 50 p. c. solution has been successfully applied to **pharyngeal tubercles** after scraping. As a pigment or spray it is occasionally used to dissolve **false diphtheritic membranes.** On the stomach, it acts like hydrochloric acid, and is often given as a **gastric adjuvant** in **dyspepsia.** It allays thirst in **diabetes** and other diseases. Sour butter-milk may be used as a substitute for the same purpose. It is said to be useful in the **diarrhœa of phthisis** and of **enteric fever,** and in the **green diarrhœa of infants.** It enters the blood as a lactate, and is eliminated in the urine as a carbonate or carbonic acid in solution.

ACIDUM OLEICUM. Oleic Acid.

Hydrogen Oleate. $CH_3(CH_2)_7CH : CH(CH_2)_7COOH$.

Source.—Obtained by the saponifying action of alkalis and subsequent action of acids, or by the action of superheated steam, upon the olein of fats.

Characters.—A straw coloured liquid, odor faintly rancid. *Solubility.*—In alcohol (90 p. c.), chloroform or ether. *Impurities.*—Rarely pure. Palmitic and stearic acids.

Enters into.—The preparation of Oleates of Lead, Mercury and Zinc, and of Ointments of Aconitine, Atropine, Cocaine, Mercuric Oleate and Veratrine.

Actions and Uses.

Oleic acid penetrates the skin more readily than fixed oils and fats, and is therefore used in pharmacy for compounding ointments containing metallic oxides and alkaloids.

ACIDUM SALICYLICUM.

Salicylic Acid. $C_6H_4 \cdot OH \cdot COOH$.

Source.—It is of two kinds.—(1) **Natural Salicylic Acid,** prepared from natural salicylates, such as the oil of winter green

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*Gaultheria procumbens.* N. O. *Ericaceæ*), or the oil of sweet birch (*Betula lenta.* N. O. *Betulaceæ*). (2) **Artificial Salicylic Acid**, prepared by the interaction of sodium carbolates and carbonic anhydride. *Physiologically pure* artificial salicylic acid is now obtainable.

Characters.—Prismatic, colorless crystals; taste sweetish then acid, leaving a burning sensation in the throat. Light, easily diffused, irritating to the nostrils. *Solubility.*—1 in 500 of cold water and 1 in 15 of hot water, 1 in 3 of alcohol (90 p.c.), 1 in 2 of ether, 1 in 200 of glycerin; also soluble in solutions of ammonium acetate, ammonium citrate, borax, sodium phosphate, alkaline hydroxides and carbonates. *Impurities.*—Meta- ortho- and para-cresotic acids, phenol, coloring matter, &c.

Identification.—Salicylic acid resembles Strychnine, but the crystals of the latter are larger, non-irritating, less soluble, and make an intensely bitter solution.

Incompatibles.—Iron salts. Quinine Sulphate and nitric ether.

Action.—Antiseptic, antirheumatic. **B.P. Dose.**—5 to 20 grs.

Enters into.—Inj. Cocain. Hypo., Liq. Atrop. Sulph., Salol, and the

Official Preparation.

1. **Unguentum Acidi Salicylici.**—1 in 50. A local antiseptic.

SODII SALICYLAS.

Sodium Salicylate. $(C_6H_4 \cdot OH\ COONa)_2H_2O$.

Source.—Obtained by the interaction of salicylic acid and sodium carbonate or sodium hydroxide. As there are two acids natural and artificial, so there are two sodium salts "*natural*" and "*artificial*".

Characters.—Small, colorless or white scales or tabular crystals with a pearly lustre: taste sweetish, unpleasant. *Solubility.*—1 in 1 of water, 1 in 6 of alcohol (90 p.c.). *Impurities.*—Carbolates and sulphocarbolates.

Identification.—Crystals resemble those of Benzoic Acid, but have no aromatic smell.

Incompatibles.—Acids, antipyrine, quinine and iron salts.

Action.—The same as salicylic acid. **B.P. Dose.**—10 to 30 grs. *Maximum Single Dose.*—40 grs. *Daily Dose.*—120 grs.

Enters into.—The preparation of Bismuth salicylas.

Non-Official Preparations and Derivatives of Salicylic Acid.

1. **Effervescent Sodium Salicylate.**—6 grs. in 1 dr. *Dose.*—1 dr. 2. **Ammonii Salicylas.** *Dose.*—5 to 30 grs. 3. **Calcii Salicylas**; in diarrhœa; *Dose.*—2 to 20 grs. 4. **Potassii Salicylas.** *Dose.*—5 to 30 grs. 5. **Quinine Salicylas** (see quinine). 6. **Strontii Salicylas**, in lithæmia and chronic gout; *Dose.*—5 to 20 grs. 7. **Ferri Salicylas**, antiseptic, astringent; *Dose.*—3 to 10 grs.

8. **Collodium Salicylicum.**—Salicylic Acid 30, Ext. of Indian Hemp 5. Flexile Collodion 240. A painless solvent for hard and soft corns.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

9. **Glycer. Acidi Salicylici.** *Syn.—Salicylic Cream.*—Salicylic Acid 1, Glycerin 1.

10. **Pulv. Salicylicus c. Talco.**—Salicylic Acid 3, Wheat Starch 10, Talc 87. The U. S. N. F. substitutes Boric Acid for wheat flour.

11. **Salicylic Dressings.—Gauze, Lint, Wool** 4 p.c.

12. **Salicylic and Creosote Plaster Mulls** (Unna).—½ to 1 gr. in 1 square inch, applied to horny epidermis.

13. **Salumin.** *Syn.—Salicylate of Aluminium.*—In reddish powder insoluble in water. Astringent and antiseptic. In ozæna and pharyngeal affections.

14. **Salacetol.** *Syn.—Salyl Acetol.*—A compound of Salicylic Acid and Acetol. As an intestinal antiseptic in diarrhœa in doses of from 30 to 45 grs. in 1 oz. of castor oil before breakfast.

15. **Salicylamide.**—Tasteless, colorless, soluble (1 in 250 of water) crystals, prepared by the action of strong ammonia on methyl salicylate obtainable from the oil of winter green. A safe and powerful analgesic. *Dose.*—3 to 5 grs.

16. **Agathin.** *Syn.—Salicyl-a-methyl-phenyl-hydrazone.*—White or greenish-white crystals insoluble in water. Analgesic and antirheumatic. *Dose.*—4 to 8 grs. thrice daily, to be reduced after 3 or 4 days.

17. **Dithion.** *Syn.—Sodii-Di-thio-Salicylas.*—A greyish or yellowish-white, powder soluble in water. A more powerful antirheumatic but free from objectionable sequelæ. *Dose.*—3 grs. thrice daily.

18. **Saliformin.** *Syn.—Hexa-methylene-tetramino-salicylate.*—In white, soluble crystals. A genito-urinary antiseptic and solvent of uric acid. In gout, cystitis, gravel. *Dose.*—15 to 30 grs. daily, freely diluted.

19. **Salophen.** *Syn.—Acetyl-para-amido-phenyl salicylic-ester.*—Whitish, tasteless crystals, insoluble in water. It is unaffected by gastric juice, but decomposed by the pancreatic secretion. Has a quicker action on acute rheumatism than salicylic acid. *Dose.*—10 to 30 grs. in cachets.

20. **Aspirin.** *Syn.—Salicylo-Acetic Acid.*—A valuable substitute for sodium salicylate. Largely used in rheumatism, gout, all neuralgic affections and diabetes. Particularly useful in migraine and nervous headache. Leaves no bad after effects, doses not cause tinnitus, and does not irritate the mucous membrane of the stomach. *Dose.*—5 to 15 grs. in tabloids or suspended in water.

21. **Dymal.**—*Didymium Salicylate.* 10 p.c. wool fat ointment recommended for eczema.

22. **Glycosal.**—*Mono-Salicylic Glycerin Ester.* Prevents fermentation in bladder. Recommended in cystitis. *Dose.*—45 to 90 grs.

23. **Rheumatin.** *Syn.—Saloquinine salicylate.*—A white powder, slightly soluble in water. Given in acute rheumatism. *Dose.*—15 grs. repeated.

SALICINUM.

Salicin. N.O. *Salicaceæ.* $C_6H_{11}O_5 \cdot O \cdot C_6H_4 \cdot CH_2OH$.

Habitat.—Temperate regions of the Northern Hemisphere.

Source.—A crystalline glucoside obtained from the bark of various species of *Salix* and of *Populus.*

Characters and Tests.—Colorless, shining, trimetric tabular crystals: taste bitter. *Solubility.*—1 in 28 of cold water, 1 in 60 of alcohol

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(90. p.c) *Tests*—colored red by H_2SO_4. Heated with potassium bichromate, a few drops of H_2SO_4 and water, yields salicylic aldehyde having the odor of meadow-sweet.

Action.—The same as sodii salicylas. **B.P. Dose.**—5 to 20 grs. *Daily Dose.*—150 grs. in cachets, pills or mixture.

Non-Official Derivatives and Allied Preparations.

1. **Saligenin** *Syn.*—*Salicylic Alcohol.*—In colorless leaflets soluble in water, obtained either by acting on phenol with formic aldehyde or on salicin with diluted mineral acids. In acute rheumatism and gout. *Dose.*—5 to 10 grs.

2. **Salix Nigra** or *Black Willow.*—A sexual and uterine sedative, considered useful in hyperæsthesia and pain of ovaritis, seminal emissions, and nymphomania. The liquid extract of bark, root and buds (1 in 1) is given in ½ to 1 dr. thrice daily.

Pharmacology of Salicylic Acid and Salicin.

Externally—Salicylic acid and salicin are **antiseptics**, but the acid is the most powerful. A 2 per cent solution of the acid kills bacteria and checks fermentation, but its salts have no antiseptic properties. Salicylic acid is a powerful **local anhidrotic.** Applied to the nose it causes sneezing and cough. It softens and removes the epithelium.

Internally. **Alimentary canal**—Salicylic acid is an **irritant** to the stomach, when taken undiluted, causing pain, nausea and vomiting. Sodium salicylate, salicin and aspirin are less irritant. Salicin is a **bitter, stomachic, tonic.** Salicin is transmitted unchanged into the intestine, where it is broken up probably by the help of the pancreatic juice. Salicin is partly converted into **saligenin** and **glucose**, and saligenin again into salicyluric, salicylous and salicylic acids

Blood.—Salicylic acid enters the blood as a sodium salicylate, which, at any rate, is the form in which it is found in the blood. Some think it exists as an albuminate, but of this there is no proof. There is also no evidence to show that sodium salicylate is converted again into salicylic acid by carbonic acid. However, the fact remains that a portion of the salicylic acid of the salicylate unites with glycocoll either in the blood or tissues to form salicyluric acid; thus $HC_7H_5O_3$ (salicylic acid) $+ C_2H_5NO_2$ (glycocoll) $= HC_9H_9NO_4$ (salicyluric acid) $+ H_2O$. This chemical change is identical with what happens in the conversion of benzoic acid into hippuric acid.

Heart and blood vessels.—Salicylic acid and salicin are said to **depress the heart** and **lower the blood pressure**, but salicin does not act so, unless given in toxic doses. Again, the natural salicylic acid is not so depressant as the artificial one, because the latter contains certain impurities, such as **orthocresotic acid** which is a strong **cardiac sedative.** Physiologically pure artificial acid is not a depressant.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Respiration.—Medicinal doses have no action on respiration. Large or toxic doses greatly **depress** it, and may cause death from asphyxia.

Temperature.—The salicylates in moderate doses, do not affect the normal temperature but act powerfully as febrifuges, probably by influencing metabolism. They are therefore **antipyretics.** A single dose of 20 to 30 grs of sodium salicylate may bring down the temperature of 105° F. to 101° F. in 2 or 3 hours.

Skin.—Salicylic acid and sodium salicylate do not increase perspiration in health, but in fevers they produce a copious sweating. Salicin does not cause diaphoresis in moderate doses. The writer has seen a boy 12 years old, sweat continuously for two weeks after taking 90 grs. of sodium salicylate in 4 days. Urticaria and erythema sometimes break out.

Liver.—The salicylates are direct **hepatic stimulants,** sodium salicylate or salicylic acid being most powerful. The secretion of bile is increased, and it is rendered thin and watery. There is however a total increase in the solids of the bile. In this respect the action of sodium salicylate resembles that of sodium benzoate.

Nervous system.—Their action on the nervous system is ill understood. They produce a train of symptoms identical with cinchonism (see salicylism).

Kidneys.—Salicylic acid is excreted in the urine as salicyluric acid and sodium salicylate, which is broken up into salicylic acid by the phosphoric acid in the urine. It can be detected in 10 to 30 minutes in the urine after ingestion, but its excretion is slow. It sometimes causes nephritis with bloody and albuminous urine. Large doses increase the excretion of urea and uric acid, and give sometimes to the urine a greenish color due to the presence of indican or pyrocatechin. It renders the urine **antiseptic** and **increases its acidity.** It has a gentle stimulating and disinfecting influence on the urinary passages. The urine of the patients taking salicylic acid gives a **purple color** on the addition of a drop of Tr. Ferri Perchlorid. As Aspirin is now frequently given for the treatment of diabetes, it is important to bear this fact in mind when testing the urine of a diabetic patient for di-acetic acid, which gives a somewhat similar colour with Ferric Perchloride. In case of doubt boil the urine and test for acetone.

Uterus.—Some think that salicylic acid is **emmenagogue** and causes **abortion,** but there is no sufficient evidence to confirm this statement.

Elimination.—Salicylates are thrown off chiefly by the urine, and to a less extent by the sweat, saliva, bile, sputum and fæces.

Acute toxic action or **Salicylism.**—The symptoms are identical with cinchonism. Buzzing in the ears, disturbed vision and headache are

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the early symptoms. When they appear, the further administration of the drugs is to be suspended. If the drugs are pushed on, nausea, vomiting, involuntary evacuations, deafness, delirium, flushed face, weak and irregular pulse, weak shallow breathing, epistaxis, hæmaturia, albuminuria follow. If still persisted in, death may occur from either cardiac or respiratory paralysis. Charteris has demonstrated that most of the toxic symptoms are referable to the impurities of the synthetic product, probably orthocresotic acid. Natural salicylic acid or its salts rarely produce toxic symptoms.

THERAPEUTICS OF SALICYLIC ACID AND SALICIN.

Externally.—Salicylic acid is largely employed in surgical practice in the form of a lotion, ointment, lint, cotton, &c. Small **epitheliomas** and **chancres** soon heal, when pure acid is daily dusted over them. In **lupus, corns** and **tylosis** Collodium Salicylas is a useful application. A hot strong solution is recommended in **acne**, and an ointment containing ½ dr. of carbolic and salicylic acids each in 1 oz. cures **ringworm**. Being non-volatile, it is not an effective antiseptic for deep suppurating wounds. Pulv. Salicylas c. Talco is an excellent application for checking **excessive sweating** in phthisis, and **fetid perspiration** of the feet and arm-pits. A 1 to 4 p.c. solution, or an ointment (1 to 6) often **checks** the **itching** of **eczema intertrigo** and **urticaria.**

Internally.—Salicylic acid is locally applied to **diphtheritic membranes.** Salicylic acid is used as an internal antiseptic, in **sarcinous vomiting** and **fermentative dyspepsia.**

As an *antirheumatic*, salicylic acid and the salicylates are considered specifics for **acute rheumatism**, possibly by the setting free of salicylic acid in the inflamed part by the carbonic acid in it. They reduce the temperature, lessen the swelling, and relieve the pain, if 20 to 30 grains are given every 2 hours, until 4 to 6 doses are swallowed, and then at longer intervals. Even after an apparent cure, they should be continued for one or two weeks. It is said that liability to cardiac complications is minimised by salicylic acid treatment but many doubt this assertion. Indeed some authorities avel that the tendency to both endocarditis and pericarditis is greatly increased by the use of salicylates in acute rheumatic fever. In the **hyperpyrexia** of rheumatism, salicylates are of no use. In chronic **rheumatoid arthritis, gout, gonorrhœal rheumatism,** opinions differ as to their utility. Where sodium salicylate is contra-indicated, salicin may be given with advantage.

As an *antipyretic*, sodium salicylate and salicin may often be usefully employed in **typhoid, remittent, intermittent, inflammatory** or **specific fevers.** In some chronic **malarial fevers,** salicin and sodium salicylate act better than quinine and arsenic. Sodium salicylate 3 grs. given hourly gives better results in **quinsy** than aconite or guaiacum.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

As a *hepatic stimulant*, all these drugs may be given in **torpidity of the liver** and **catarrhal jaundice**, but sodium salicylate is the most effective. Sodium salicylate and aspirin are both useful in the treatment of **hepatic colic**, and are given with benefit as solvents of **gall stones**.

As an *analgesic*, sodium salicylate may be given in **neuralgias** and **lumbago**, and is considered to be the best remedy for **sciatica**. In **chronic sciatica**, it gives the best result when given with iodides.

Sodium salicylate and aspirin have been found to reduce the quantity of sugar of the urine in **diabetes**.

Prescribing hints.—Sodium salicylate is best given in solution. If mixed with ammonia, the mixture gradually turns from **pale-yellow** to **brown** on exposure to air. When given with quinine or citric acid, precipitation occurs (see p 83).

Caution.—The natural or the physiologically pure artificial salts are alone to be used. They should be given with caution to children, old and weak individuals, and persons suffering from cardiac and renal diseases. The administration of the drugs is to be suspended if headache, deafness and ringing in the ears show themselves.

SALOL. Salol.

Phenyl Salicylate. $C_6H_4.OH.COO.C_6H_5$.

Source.—By interaction of salicylic acid and phenol, or of their sodium salts with phosphoryl chloride or carbonyl chloride.

Characters.—Colorless crystals with a faint aromatic odor and little taste. *Solubility.*—Insoluble in water, 1 in 20 of alcohol (90 p.c.), and in fixed and volatile oils. *Impurities.*—Free salicylic acid, sulphates and chlorides.

Action.—Intestinal antiseptic and analgesic.

B.P. Dose.—5 to 15 grs. in milk or cachets.

Non-Official Preparations and Derivatives.

1. **Collodium Salol.**—Salol 4, Ether 4, Collodion 30. An effective application in acute rheumatism.

2. **Salol cum Camphora.**—Salol 3, Camphor 2. Triturate. A strong antiseptic liquid to check suppuration of the middle ear, and in the treatment of carbuncles.

3. **Ung. Salol c. Cocaina.**—Salol 2, Cocaine Hyd. 1, Petroleum Cerate 16 Mix. In burns.

4. **Salol Tribromide.** *Syn.*—*Cordol.*—A colorless tasteless, powder. A remote astringent and safe hypnotic. *Dose.*—20 to 30 grs.

Pharmacology and Therapeutics.

Externally.—Mixed with talc, it may be used as an antiseptic dusting powder.

Internally.—It splits up in the intestine into salicylic and

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

carbolic acids. On this account it is apt to cause *Carboluria* and it should therefore never be given in too large doses, or for too long a period continuously, or to persons suffering from renal disease. It has been used in **rheumatic fever**, but possesses no advantages over the other preparations of salicylic acid, and it is certainly more dangerous.

Its chief use is as an **intestinal** and **urinary antiseptic**. There can be no doubt of its value in bladder surgery, and it is given with advantage both *before* and *after* **all operations upon the urinary tract**. As an intestinal antiseptic it is falling into disrepute, as many authorities doubt both the possibility and advisability of attempting to sterilise the contents of the intestines. If used for this purpose it should be given in combination with bismuth salicylate and sodium bicarbonate.

ACIDUM SULPHUROSUM.

Sulphurous Acid. H_2SO_3.

Source.—An aqueous solution containing 6 4 p c. of hydrogen sulphite, H_2SO_3, corresponding to 5 p.c. by weight of SO_2. The sulphurous anhydride may be prepared by burning sulphur in air or oxygen, or by boiling sulphuric acid with carbon, mercury, or copper.

Characters.—A colorless liquid with a pungent sulphurous odor. Sp. gr. 1 025. *Impurities.*—Sulphuric acid, mineral matters.

Action.—Antiparasitic, antiseptic. **B.P. Dose.**—½ to 1 dr

Official Preparation.

1. **Sodii Sulphis.** Sodium Sulphite.—See Sodium Salts.

Non-Official Preparation.

1. **Sodii Hyposulphis.**—As a lotion (1 in 10) for chloasma, ringworm, &c. In flatulent dyspepsia 5 grs. 2 hours after meals. *Dose.*—10 to 60 grs.

Pharmacology and Therapeutics.

Externally.—Sulphurous acid is a powerful **deoxidising agent, a disinfectant, a deodorant** and an **antiseptic**. Sulphurous acid gas is chiefly used for disinfecting infected rooms. Disinfection is best carried on by carefully closing all doors and windows, crevices being pasted over with paper, and sulphur being burnt in the room for at least six hours. Use 2 lbs. of sulphur for every 1000 c. ft. of air space. Also remember to wet the floor as dry fumes of SO_2 are useless for disinfecting purposes. Metallic substances left in the room should be greased, and colored fabrics removed, as the gas has bleaching properties. Infected clothes may also be disinfected by sulphur fumes. A lotion (2 drs. to 1 oz.) is said to be efficacious in **ringworm, foul ulcers,** and **chloasma**. Sulphur fumigation quickly removes **scabies**, if it is resorted to after a hot water bath with friction. (see p. 70.)

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Internally.—As a spray it is of use in **gangrenous stomatitis** and **diphtheritic ulcers**. On the stomach and intestine it produces the same disinfecting and antiseptic effects as on the skin and is absorbed as a sulphate. It is sometimes given with benefit in **pyrosis** and **fermentativo dyspepsia** due to sarcinæ. Sulphites and hyposulphites may be used for the same purposes as the acid.

ACIDUM TANNICUM. See Galla.

ACIDUM TARTARICUM. See page 185.

ACONITI RADIX.

Aconite Root. N. O. *Ranunculaceæ.*

Syn.—Monk's hood. **Syn. I. V.**—*kátbis, Dudhiá bish,* Hind.

Habitat.—Britain, the Alpine and the Himalayan mountains.

Source.—Dried roots of *Aconitum Napellas* cultivated in Britain, collected in the autumn.

Characters.—2 to 4 in. long, ½ to ¾ in. in diameter at the upper extremity, gradually tapering below; marked with the bases of rootlets and scars and crowned with the *remains of an undeveloped bud*; *dark-brown* externally; *whitish and starchy* internally; no odor; cautiously chewed produces a sensation of *tingling* and *numbness.*

Identification.—It resembles *horseradish* (*q. v.*) from which it is distinguished by its brown-black color, starchy fracture and the tingling sensation produced in the mouth by chewing.

Composition.—(1) *Aconitine,* the chief active principle. (2) *Benzaconine.* (3) *Aconine.* (4) *Aconitic acid.*

Action.—A powerful poison. A cardiac depressant.

Official Preparations.

1. **Linimentum Aconiti.**—1 in 1½. A local anodyne and sedative.
2. **Tinctura Aconiti.**—1 in 20. **B.P. Dose.**—5 to 15 ms. *Repeated Dose.*—1 to 3 ms.
3. **Aconitina.**—See below.

Non-Official Preparations of the Aconite Root.

1. **Chloroformum Aconiti. B.P.C.**—Root 20 ozs., Strong Ammonia Solution 1½ ozs., Water 20 ozs., Chloroform *q.s.* Macerate with ammonia and water for 4 hours. Dry and powder. Macerate for 24 hours with chloroform 20 ozs. in a percolator, and percolate slowly to 30 ozs. Mixes with oils and liniments. A powerful sedative in neuralgia, &c.
2. **Linimentum Aconiti Comp. A.B.C. Liniment.**—Aconite, Belladonna and Chloroform liniments in equal parts.

ACONITINA. Aconitine. $C_{33}H_{45}NO_{12}$.

Source and Characters.—A colorless alkaloid obtained from aconite root. *Solubility.*—Readily in chloroform and alcohol (90 p.c.), less readily in ether, nearly insoluble in water.

Action.—A virulent poison. Should never be used internally.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparation.

1. **Unguentum Aconitinæ.**—1 in 50. Action is the same as that of the liniment.

Non-Official Preparation.

1. **Oleatum Aconitinæ.**—Aconitine 2 grs., Oleic Acid 98 grs. Dissolve. A mild local sedative.

Pharmacology.

Externally.—When applied to the skin or mucous membrane, aconite first **stimulates** then **paralyses the terminations of the sensory nerves**, thereby causing **tingling, numbness and anæsthesia.**

Internally. **Gastro-intestinal tract.**—In medicinal doses, well diluted, aconite produces no tingling or numbness in the mouth. In large doses, it causes **gastro-intestinal irritation**, such as nausea, vomiting, diarrhœa, &c. Aconitine is readily absorbed, and can increase **salivary and intestinal secretions.**

Heart.—In minute doses (1 m. of the Tr.) it **slows and steadies the pulse**, but in larger doses **paralyses the heart, reducing the force, volume and frequency** of the pulse. In still larger doses the cardiac beat becomes feeble, irregular and accelerated, stopping at last in diastole. This is due to its action either on the **vagal roots** or on the **muscular fibres of the heart.** The **blood-pressure falls** chiefly from the paralysis of the heart, and to some extent from that of the **vasomotor centre.**

Respiration.—After a brief stimulation respiration becomes **slow, deep, irregular and laboured** owing partly to the **paralysis of the respiratory centre**, and partly to the depressed condition of the circulation and to the irritating effect on the motor centres.

Temperature.—A febrile temperature is **lowered by** aconite : this effect is produced partly by its depressant action upon the heart and the respiratory centre, partly by increased diaphoresis, and partly by diminished metabolism.

Nervous system.—Whether applied locally or taken internally, aconite first **stimulates** and then **depresses the periphery of the sensory nerves.** The brain remains unaffected. The **pupils** first contract, then dilate. Large doses first stimulate and then depress the motor centres in the spinal cord, causing clonic convulsions followed by muscular weakness and the abolition of the spinal reflexes.

Skin.—Perspiration is **increased**, the mode of action is not known. It sometimes gives rise to an erythematous rash.

Kidneys.—Aconite acts as a mild **diuretic.** The mode of **elimination** is unknown.

Acute toxic action.—Within a few minutes after swallowing a

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

poisonous dose of aconite, severe tingling and burning followed by numbness are noticed in the mouth and gullet. Intense abdominal burning; vomiting; cold clammy or profuse sweating; tingling, formication and numbness of the skin; small, feeble, irregular pulse; fixed, staring eyes with dilated pupils; difficult respiration; muscular weakness; prostration; fainting; sometimes convulsions; and lastly death either from asphyxia or occasionally from syncope—are the symptoms of poisoning by this drug. Consciousness remains clear, more or less, till death.

Antidotes.—Emetics, pump, stimulants, hot bottles, friction, sinapisms to the heart. Digitalin, strychnine and atropine are its physiological antidotes. Amyl nitrite inhalation is recommended by Murrell.

Physiological antagonists.—Digitalis, strychnine, atropine, ammonia, ether and alcohol.

The action of the remaining alkaloids is very peculiar as will be seen from the following:—

Benzaconine.—It is bitter and less toxic and does not cause tingling. Its action is entirely antagonistic to that of aconitine. It slows the pulse-beat, the ventricles contracting once for every two or three auricular contractions. It interferes with the motor nerves and does not paralyse the sensory nerves.

Aconine, though bitter, does not cause numbness or salivation. It strengthens the ventricular systole and opposes inco-ordination of the heart-beat which aconitine causes. In large doses, it depresses respiration and motor nerves.

THERAPEUTICS.

Externally.—Aconite in the form of a liniment or ointment is applied for the relief of pain in **neuralgia, sciatica, muscular rheumatism** and **inflammatory joint affections.** The addition of chloroform increases its efficacy, as it facilitates absorption. For this reason, Chloroformum Aconiti, B. P. C. or the A. B. C. liniment is more effective than the B. P. preparation.

Internally.—Aconite is not so largely used now in fevers as formerly. Nowadays its use is confined chiefly to **inflammatory fevers,** such as pneumonia, pleurisy, peritonitis, pericarditis, erysipelas, acute rheumatism, gout, gonorrhœa, otitis, urethral fever, tonsillitis, sorethroat, &c. In many of these cases it should be given in small doses (1 or 2 ms. of the tincture) rather frequently until there is a fall of temperature, sweating and relief of the symptoms. It should never be given in **continued fevers,** such as typhus, typhoid and low remittents. It may be used with advantage in cases of palpitation of nervous origin, as well as in that due to cardiac hypertrophy or aneurism. It is an excellent remedy for re establishing arrested menstruation. A few drops of the tincture given at bed time have a quieting effect on the restlessness of many neurotic patients. As a local gastric sedative, it has been prescribed for the **vomiting of pregnancy.**

Caution.—Old persons or those who suffer from cardiac weakness and respiratory disorders, should not be treated with this powerful remedy. Children and plethoric subjects bear it well.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Prescribing hints.—If aconitine ointment is ordered, a small bit of the size of a bean is to be rubbed in with the tip of the finger over the painful part; care being taken that it does not come in contact with an abraded and mucous surface. If applied over the temples, see that it does not get into the eyes. The best method of administration is to order the tincture in 1 m. doses every 15 or 30 minutes, until the pulse begins to be affected, then gradually to increase the intervals according to the needs of the patient; this is safer than commencing with the full B.P. dose.

ADEPS. Lard.

Syn. I.V.—*Suarke charbi*, Hind.

Source.—The purified fat of the hog, *Sus scrofa*.

Characters.—A soft, white, neutral, fatty substance, melting at 100° F. *Impurities.*—*Starch, common salt.*

Composition.—(1) *Olein.* (2) *Stearin.* (3) *Palmitin.*

Enters into.—Emp. Canthar., Pil. Phosph., and 8 ointments, and the

Official Preparations.

1. **Adeps Benzoatus.**—1 in 33⅓. *Enters into.*—12 ointments.
2. **Adeps Induratus** is the ordinary lard from which a portion of the oil has been removed by pressure. For use in India and the Colonies when high temperature renders the ordinary lard too soft.

ADEPS LANÆ. Wool Fat.

Source.—The purified cholesterin fat of sheep's wool, obtained by heat and pressure.

Characters.—Yellowish, tenacious, unctuous inodorous. *Solubility.*—In chloroform, ether, partially in alcohol (90 p.c.).

Official Preparation.

1. **Adeps Lanæ Hydrosus.** *Syn.*—*Lanoline.* *Enters into.*—Ung. Conii and Ung. Hamamelidis.

Actions and Uses.

Lard and wool fat are largely employed in pharmacy for making certain ointments. They are **emollients**. Adeps lanæ is a non-irritant and is readily absorbed, and is therefore used as a basis for the ointment of many active drugs. Benzoated lard does not turn rancid but it is rarely used now.

ADRENALIN. See Organotherapy.

ADHATODA. Adhatoda.

N O. *Acanthaceæ.* (*Ind. and Col. Addendum.*)

Syn. I.V.—*Bákas*, Beng. *Arushá*, Hind. *Adulsá*, om.

Habitat.—India, Eastern Colonies.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—The fresh and the dried leaves of *Adhatoda Vasica* (*Justicia Adhatoda*).

Characters.—Fresh leaves 5 to 6 in. long. 1½ in. broad, lanceolate, entire, taper-pointed, smooth. Dried leaves dark-green. Their odour is tea-like and their taste bitter.

Composition.—(1) *Vasicine* a crystalline alkaloid. (2) An *Organic Acid.* (3) *Ammonia.*

Official Preparations.

1. **Extractum Adhatodæ Liquidum.**—Dried powder 20 ozs., Alcohol (60 p.c.) *q. s.* to produce 1 pint by percolation and evaporation. **B.P. Dose.**—20 to 60 ms.

2. **Succus Adhatodæ.**—Freshly expressed and strained. **B. P. Dose.**—1 to 4 drs.

3. **Tinctura Adhatodæ.**—Dried power 2½ ozs., Alcohol (60 p. c.) *q. s.*, to produce 1 pint by percolation. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Adhatoda Cigarettes.**—In asthma. 2. **Decoctum Adhatodæ.**—Powdered leaves 4 ozs. water 1 pint; boil for 10 minutes. *Dose.*—1 to 2 ozs.

3. **Syrupus Adhatodæ.**—Can be prepared like Syrupus Hemedesmi, or by adding liquid extract to the syrup. *Dose.*—1 to 2 drs.

Pharmacology and Therapeutics.

Externally.—The leaves possess **insecticide** properties, and are therefore considered to be a valuable remedy for blight on tea and other crops. Dr. Watt suggests its use as a **germicide** for drinking water.

Internally.—Both the leaves and roots are stimulant **expectorants** and **bronchial antispasmodics.** The roots may be used as a substitute for senega. Adhatoda is an excellent remedy for **chronic bronchitis, phthisis** and **bronchial asthma.** The decoction of the root-bark is frequently used by the natives of this country in catarrh, mild fever and bronchitis. The writer considers it useful in mild forms of **pertussis,** especially if it is complicated with bronchitis. The leaves smoked in the form of a cheroot relieve **asthma,** as they evolve ammoniacal vapor when burnt.

ÆTHER. Ether.

Ethyl Oxide. $(C_2H_5)_2O$.

Syn.—Ethylic Ether. Sulphuric Ether.

Source.—From ethylic alcohol by interaction with sulphuric acid, containing 92 p.c. of ethyl oxide by volume.

Characters.—A colorless, volotile, inflammable liquid: odor strong, characteristic; sp. gr. 0·735. *Solubility.*—Freely in alcohol (90 p.c.), chloroform, fixed and volatile oils. *Impurities.*—Water, alcohol, free acid, oil of wine.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Identification.—Resembles chloroform, from which it differs by its characteristic odor and inflammability.

Action.—Diffusible stimulant, local and general anæsthetic.

B.P. Dose.—10 to 30 ms. for repeated administration, and 40 to 60 ms. for a single administration.

Enters into.—Collod. Flexile, Tr. Lob. Ether., and the

Official Preparations.

1. **Æther Purificatus.**—Ether from which water and ethylic alcohol are removed by washing and distillation. Sp. gr. 0·720.

2. **Spiritus Ætheris.**—1 in 3 **B.P. Dose.**—20 to 40 ms. for repeated use, 60 to 90 ms. for a single dose. *Enters into.*—Tr. Lobel. Ether.

3. **Spiritus Ætheris Compositus.** *Syn.*—*Hoffmann's Anodyne.*—1 in 8 nearly. **B.P. Dose.**—The same as that of Æther.

Non-Official Preparations.

1. **Æther Methylatus.**—Prepared from methylated alcohol, Sp. gr. 0·717. Suitable for local anæsthesia and inhalation.

2. **Spiritus Ætheris Muriaticus.** *Syn.*—*Sp. Salis Dulcis. Clutton's Febrifuge Spirits.*—Used in febrile affections. *Dose.*—30 to 60 ms.

Pharmacology of Ether.

The action of ether is identical with that of chloroform.

Externally.—Being extremely volatile, ether freezes and paralyses the peripheral ends of the sensory nerves of the part to which it is applied, and is therefore a **local refrigerant** and **anæsthetic.** These local actions are best obtained when it is used as a spray. If the freezing is continued too long, the part may die. If means be taken to prevent evaporation, it acts as **rubefacient** and **vesicant.**

Internally. **Mouth.**—It produces a burning, disagreeable, characteristic taste in the mouth, and reflexly stimulates **salivary secretion.**

Stomach and intestine.—It is quickly absorbed, and stimulates the blood-vessels, nerves and muscular fibres of the stomach, thereby increasing the secretion of the gastric juice and expelling gas. It is therefore a gastric **stimulant** and **carminative.** It reflexly stimulates the bowels, heart and lungs. It is an **intestinal antispasmodic** and appears to excite the action of the liver and pancreas.

Heart and lungs.—Upon the heart and lungs it acts both as a reflex and direct stimulant, raising the blood-pressure and improving the tone and frequency of the pulse and respiration. It is therefore a good **cardiac stimulant.**

Nervous system.—Ether acts on the nervous system in the following order.—1st the cerebrum, 2ndly the sensory spinal centres, 3rdly the motor spinal centres, 4thly the sensory centres in the medulla, and 5thly the motor centres in the medulla. When inhaled, ether produces general anæsthesia, in which respect it

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

resembles chloroform. There are however certain marked differences between the two drugs. These are tabulated below :—

Ether.	Chloroform.
1. Ether should be used in a concentrated form ; 70 p.c. of ether and 30 p.c. of air.	Chloroform must be given well diluted ; 95 to 97 p.c. of air and 5 to 3 p.c. of chloroform.
2. Ether being inflammable, no fire should be brought close to the mouth.	Chloroform is not inflammable.
3. A large quantity is needed to produce anæsthesia (Whitla used in one case 1½ pints).	A small quantity, say 3 drs. to 1 oz. is enough.
4. The smell of ether is disagreeable.	The smell of chloroform is not disagreeable.
5. With ether, the stage of stimulation is very much protracted, consequently there is more struggling.	With chloroform, the stage of stimulation is shorter, and therefore less struggling.
6. The stage of anæsthesia is shorter, and the degree of anæsthesia is less profound.	The stage of anæsthesia is more complete, and the degree more profound,
7. The fall of temperature is great (Dr. Hare observed 4.4°F. in man).	The fall of temperature is slight.
8. More Bronchial than gastric irritation.	Less bronchial but more gastric irritation.
9. Cardiac, respiratory and vasomotor centres are not readily paralysed ; hence ether is a *safer* anæsthetic.	Cardiac, respiratory and vasomotor centres are readily paralysed ; hence chloroform is *not* so safe as an anæsthetic.
10. Lung complications such as bronchitis, pneumonia are frequent.	Lung complications are uncommon.
11. Elimination is very slow, consequently the smell hangs about the body for a long poriod.	Elimination is rapid, consequently the smell does not hang about so long.
12. Death from syncope during inhalation is less probable in subjects of cardiac weakness.	Death from syncope is more probable in subjects of cardiac weakness.

THERAPEUTICS OF ETHER.

Externally.—In the form of a spray, ether relieves the intense pain of **neuralgia** and of superficial minor **surgical operations**. For the latter purpose, the part must be frozen for the time being. As this anæsthesia does not extend into the deeper tissues, ether is not a suitable local anæsthetic for deep surgical operations. Subsequent tingling and smarting are also a drawback. In like manner, the lightening pains of locomotor ataxy, and choreic and tetanic spasms may be relieved.

Internally. **Stomach and intestine.**—Like alcohol and chloroform, it may be given in some forms of **dyspepsia** to expel

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

gas and relieve gastrodynia and cramps. It also benefits those forms of dyspepsia which are caused by defective pancreatic secretion. It improves the taste and helps the assimilation, of cod-liver oil when combined with it. Hoffmann's Anodyne is excellent for the relief of **intestinal and biliary colic.** Durande's mixture of ether and turpentine is said to act as a **biliary lithontriptic** in gallstones.

Heart and lungs.—It is an excellent cardiac and respiratory stimulant, whether given by the mouth, or hypodermically (10 to 40 ms.), in **syncope, palpitation** or **cardiac failure** from any cause, but its action being transient, it has to be repeated. In full doses, it relieves pain and distress in **angina, spasmodic bronchitis** and **asthma.** Sometimes it may be given with advantage to improve the tone and allay the irritability of the heart in **delirium tremens.**

Nervous system.—For its antispasmodic properties, it is occasionally given in **hysterical and epileptic threatenings.**

General anæsthesia.—To produce complete insensibility, pure ether must be inhaled. The mode of inhalation and the necessary precautions are almost the same as those for chloroform inhalation (which see). Inhalation is commenced by pouring an ounce of ether on to a sponge in an inhaler, and this is renewed as often as may be necessary and till the anæsthesia is induced. The effect is more rapid if the sponge is wrung out of hot water. Either pure ether, A. C. E. mixture (alcohol absolute 1, chloroform 2, ether 3), or E_2C_1 (ether 2, chloroform 1) may be continued, if the anæsthesia requires to be kept up for a long time. The administration of a few whiffs of nitrous oxide gas in the beginning makes it much pleasanter for the patient. Dr. Buxton recommends inhalation of ether with oxygen in certain cases, where the induction presents difficulties from spasm, cough, holding of breath, struggling with cyanosis, in alcoholics and in persons of weak vitality.

Caution.—The inhalation of ether is contra-indicated in those operations upon the mouth which require the use of artificial light or the cautery. Ether is not a suitable anæsthetic for children, on account of its pungent vapor and its tendency to cause bronchial irritation. For the same reasons it is unsuitable for any laryngeal or tracheal operation.

ÆTHERIS NITROSI SPIRITUS.

Spirit of Nirous Ether.

Syn. B.P.—Sweet Spirit of Nitre.

Source.—Obtained by distilling a mixture of alcohol (90 p.c.) nitric and sulphuric acids and copper; containing ethyl nitrite (2½ p.c.).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—A limpid, faintly yellow, inflammable liquid; odor penetrating, apple-like; taste characteristic; sp. gr. 0·838 to 0·842. *Impurities.*—Excess of acid and deficiency of ethyl nitrite.

Composition.—Ethyl nitrite, aldehyde, acetic ether, acetic acid, &c.

Identification.—Its peculiar apple-like odor helps recognition.

Incompatibles.—Potassium and other soluble iodides, iron sulphate, antipyrin, salicylates, tannic and gallic acids, tincture of guaiacum and emulsions.

Dispensing hints.—It should be kept in small hermetically sealed bottles in the dark. The addition of a few crystals of potassium bicarbonate to the liquid keeps it neutral. It can be extemporaneously prepared by mixing **Itrosyl** (a concentrated form of nitrous ether) 1, with alcohol (90 p.c.) 19.

Action.—Diaphoretic, diuretic, antispasmodic. **B.P. Dose.**—20 to 40 ms. for repeated use, and 60 to 90 ms. for a single dose.

PHARMACOLOGY.

Externally.—It causes a slight **local anæsthesia** by evaporation, when applied to skin.

Internally.—It possesses the combined properties of ether and nitrites which it contains, but in a milder degree. It is therefore a mild **diffusible stimulant, antispasmodic** and **carminative.**

Heart, blood and blood-vessels.—It diminishes the oxygenating power of the red blood corpuscles. It **accelerates the cardiac activity** and **relaxes the peripheral blood-vessels,** but not to such an extent as the nitrites. It lowers the arterial tension like amyl nitrite, and according to Prof. Leech its effect on the circulation is more persistent than that of amyl or other nitrites. By dilating the renal and cutaneous vessels, it acts as a **diuretic** and **diaphoretic** respectively. Its **antipyretic** property is no doubt due to diaphoresis and changes in the blood corpuscles.

Elimination.—It is excreted by the kidneys and the lungs.

THERAPEUTICS.

Internally.—Spirit of nitrous ether forms one of the chief ingredients of a fever mixture, and is used in **catarrhal, intermittent, remittent, typhoid** and other febrile diseases. It is said to be specially serviceable in **fevers during dentition.** As a **diuretic,** it is an excellent remedy for **Bright's disease** after the acute inflammatory stage is passed. Dropsies of renal origin are reduced by its use, but it does little good in those of the cardiac type. It may be employed in **angina pectoris,** and to relieve the cardiac distress of the **dilated heart,** due to chronic **nephritis,** but nitrites do this better.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ETHYL NITRITIS LIQUOR.

Solution of Ethyl Nitrite.

Source.—A mixture of 95 parts of absolute alcohol with 5 parts of glycerin by volume, containing when freshly made 3 p.c. and when long kept not less than 2½ p.c. by weight of ethyl nitrite; which is obtained by the interaction of alcohol (90 p.c.), sodium nitrite, and diluted sulphuric acid at a low temperature.

Characters.—A limpid, colorless, inflammable liquid; odor and taste apple-like; sp. gr. 0·823 to 0·826. *Impurities.*—Acid, aldehyde, less ethyl nitrite.

Dispensing hints.—Should be stored in small bottles.

B.P. Dose.—20 to 60 ms.

Pharmacology and Therapeutics.

Its actions and uses are like those of amyl nitrite (which see), but less rapid and more persistent. Liqr. Ethyl Nitrite is a more trust worthy preparation than Spt. Æther. Nitrosi and is therefore introduced into the B.P.

ÆTHER ACETICUS.

Acetic Ether. $CH_3 \cdot COO(C_2H_5)$.

Source.—Prepared by distilling a mixture of ethylic alcohol, sulphuric acid, and dried sodium acetate. The distillate is then digested with potassium carbonate and purified by redistillation.

Characters.—A colorless liquid with a fragrant odor; sp. gr. 0·900 to 0·905. *Solubility.*—1 in 10 of water, freely in alcohol (90 p.c.), and ether.

B.P. Dose.—20 to 40 ms. for repeated use, and 60 to 90 ms. for a single dose.

Enters into.—Liquor Epispasticus for dissolving cantharidine.

Pharmacology and Therapeutics.

Internally.—Its action to a great extent resembles that of Sp. Æther. Co. but has a more agreeable taste and odor. It is a **stimulant, carminative** and **antispasmodic.** Its inhalation (30 ms. in water 1 pint) allays **laryngeal irritation.**

AGROPYRUM. Couch Grass.

N. O. *Graminaceæ.* (*Ind. and Col. Addendum*).

Syn. B.P.—Triticum.

Habitat.—Australasia, Eastern and Northern American Colonies.

Source.—The dried rhizome of *Agropyrum repens* (*Triticum repens*).

Characters.—Pale yellow, $\frac{1}{12}$ to $\frac{1}{10}$ in. in diameter; usually in sections ½ to 1 in. long. Furrowed longitudinally, hollow except at the nodes. No odor. Taste faint sweetish.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparations.

1. **Decoctum Agropyri.**—1 in 20. **B.P. Dose.**—½ to 2 ozs.
2. **Extractum Agropyri Liquidum.**—Couch grass 20 ozs., Alcohol (90 p. c.) and Water q. s. By digestion and evaporation to 1 pint. **B.P. Dose.**—1 to 2 drs.

Pharmacology and Therapeutics.

Internally.—It is a **demulcent** and **diuretic**, being largely employed in **cystitis** and **irritation of the urinary passages.** The decoction well diluted may be employed as a diluent. Only the fresh rhizome possesses these properties, the dried one is inert.

AJOWAN OLEUM. Ajowan Oil.

N. O. *Umbelliferæ.* (*Ind. and Col. Addendum*).

Syn. B.P.—Ptychotis Oil. **Syn. I.V.**—*Jowaner tel*, Beng. *Ajowán ke tel*, Hind.

Habitat.—India, Eastern Colonies.

Source.—The oil distilled from the fruit of *Carum copticum.*

Characters.—Colorless, odor and taste of the thyme ; sp. gr. 0.917 to 0.930. If cooled to 32° F. should yield 30 to 36 p. c. of crystalline *Thymol*, known in the Indian bazaars as *ajowán ke full*, and prepared in Central India.

Action.—Stimulant, antispasmodic, carminative and antiseptic. **B.P. Dose.**—½ to 3 ms.

Pharmacology and Therapeutics.

Externally.—The actions and uses of the oil resemble those of thymol (which see). It is a capital medicine for disguising the nauseous taste of drugs and correcting the griping of purgatives.

Internally.—**Omum water** or *Ajawan ke arak* distilled from the fruits is a valuable **carminative** and **antispasmodic** in *colic* and *flatulent dyspepsia.*

Ajowan is often chewed with *pan*, or taken with salt for indigestion.

ALCOHOL ABSOLUTUM.

Absolute Alcohol.

Source.—Ethyl hydroxide, C_2H_5OH with 1 p.c. of water by weight. Obtained by the removal of water from less strong ethylic alcohol and subsequent distillation.

Characters.—A colorless, volatile, hygroscopic liquid ; sp. gr. 0·794 to 0·7969.

Action.—A powerful caustic, possessing a strong affinity for water ; but is never used as such.

Enters into.—The preparation of Chloroform and Liq. Sod. Ethyl.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

SPIRITUS RECTIFICATUS.

Rectified Spirit. S.V.R.

Source.—A liquid containing 90 p. c. by volume of ethyl hydroxide and 10 p.c. of water; obtained by the distillation of fermented saccharine liquids. This contains 1·35 p.c. by volume more of ethyl hydroxide than S.V.R. of B.P. 1885.

Characters.—A transparent, colorless, mobile, inflammable liquid; odor characteristic, pleasant; taste spirituous burning; sp. gr. 0·8340.

Identification.—Its characteristic smell helps diagnosis. It should not be mistaken for other spirituous substances.

Dispensing hints.—There is a contraction of volume and rise of temperature on mixing it with water. The cooled liquid should be used.

Official Diluted Alcohols.

1. **Alcohol 70 p.c.**—To 100 fl. ozs. of alcohol 90 p.c. add 31 fl. ozs. of distilled water. Sp. gr. 0·8900.
2. **Alcohol 60 p.c.**—To 100 fl. ozs. of alcohol 90 p.c. add 53⅜ fl. ozs. of distilled water. Sp. gr. 0·9135.
3. **Alcohol 45 p.c.**—To 100 fl. ozs. of alcohol 90 p.c. add 105⅛ fl. ozs. of distilled water. Sp. gr. 0·9436.
4. **Alcohol 20 p.c.**—To 100 fl. ozs of alcohol add 355¾ fl. ozs. of distilled water. Sp. gr. 0·9760.

Non-Official Diluted Alcohols.

1. **Spiritus Tenuior.** *Proof Spirit.*—When the sp. gr. of alcohol is 0·920, it is called **proof spirit.** If lighter than this it is said to be "Above" and if heavier than this it is called "Under proof."
2. **Spiritus Methylatus** *Methylated Spirit.*—An impure alcohol containing about 10 p.c. of wood naphtha, and ½ p.c. of petroleum oil which render it too nauseous for drinking. It is cheap because it is duty-free. Liniments and tincture of iodine (for external use) are sometimes prepared with this for the sake of economy.

SPIRITUS VINI GALLICI.

Brandy.

Source.—Distilled from wine and matured by age, containing 36½ p.c. by weight or 43½ p.c. by volume of ethyl hydroxide.

Official Preparation.

1. **Mistura Spiritus Vini Gallici.** *Syn.—Brandy Mixture, Egg-flip.*—**B.P. Dose.**—1 to 2 ozs.

VINUM AURANTII.

Orange Wine.

Source.—Prepared by fermenting a saccharine solution to which the fresh peel of bitter orange is added. Contains 10 to 12 p.c. by volume of ethyl hydroxide.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Enters into.—The preparation of Vin. Ferri Citratis, and Vin. Quininæ.

NON-OFFICIAL PREPARATION.

1. **Vinum Aurantii Detannatum, B P.C.**—Orange wine 1 gal., gelatin ½ oz. Decant after 14 days' maceration.

VINUM XERICUM.

Sherry.

Source.—A Spanish wine containing not less thon 16 p.c. by volume of ethyl hydroxide.

Characters.—Pale yellowish brown. *Impurities.*—Salicylic acid.

Enters into.—The preparation of Vin. Antim., Vin. Colch., Vin. Ferri, and Vin. Ipecac.

NON-OFFICIAL PREPARATION.

1. **Vinum Xericum Detannatum, B P.C.**—Sherry 1 gal., gelatin ½ oz. Decant after 14 days' maceration. Both the detannated wines are suitable solvents for iron and alkaloidal salts.

The following is the list of wines shewing the amount of absolute alcohol by weight.—

Spiritus Frumenti (Whisky) 51 to 59 per cent.
Spiritus Vini Gallici (Brandy) 36·5 per cent.
Rum, Gin and Strong Liqueurs about 51 to 59 per cent.
Sherry, Port, Madeira about 16 to 22 per cent.
Champagne, about 10 to 13 per cent.
Hocks, Burgundy about 9 to 13 per cent.
Spiritus Vini Rubri (Port) 14 to 16 per cent.
Claret 8 to 12 per cent.
Ale and Porter about 3 to 5 or more per cent.
Cider 5 to 9 per cent.
Koumiss and Ginger Beer 1 to 3 per cent.

PHARMACOLOGY OF ALCOHOL.

Externally.—Alcohol is an **antiseptic**, superior to glycerin but inferior to chloroform and ether. When allowed to evaporate after application to the skin, it abstracts heat, constricts superficial blood-vessels, arrests perspiration and depresses the local sensory nerves, and thus acts as a **local refrigerant, vascular astringent, anhidrotic and anæsthetic.** On the contrary, if means be taken to check evaporation, or if it be rubbed in, it abstracts water from the skin and renders it drier and harder. After absorption, it stimulates the blood-vessels and nerves, producing redness, heat and pain, and thus acts as a **local stimulant and rubefacient.** It coagulates the albumen of the tissues but the coagulum is quickly redissolved,

Internally. **Mouth.**—Undiluted alcohol has the same action on the mouth as on the skin, causing a sort or whitish, opaque

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

pellicle from the coagulation of the albumen. This is soon dissolved by the tissue fluids. It **reflexly excites salivary secretion and cardiac action.**

Stomach.—On reaching the stomach, undiluted alcohol causes pain, burning and a feeling of warmth. In small doses and diluted, it stimulates both the peristaltic action and the secretions and absorptive power of the stomach. As a result of these actions, appetite is sharpened, digestion is promoted, and gas, if generated, is expelled, hence it is a **gastric stimulant and carminative.** By depressing the gastric nerves, it may relieve pain. When mixed with the contents of the stomach, it splits up into **aldehyde** and **acetic acid,** and precipitates a portion of pepsin, peptones and proteids, but not to such an extent as to impair the digestive process. In large and repeated doses, it irritates the mucous membrane, increases the secretion of mucus and retards the secretion of gastric juice. If this irritation is allowed to continue, the gastric follicles atrophy and dyspepsia becomes permanent, as is seen in the case of confirmed drunkards.

A moderate dose of strong alcohol, *e.g.* whisky or brandy, on reaching the stomach, at once **reflexly stimulates** the heart, dilates the blood-vessels of the body, especially those of the skin, and increases the functional activity of the organs ; hence it is a powerful **diffusible stimulant.** This action is continued after absorption into the circulation.

Intestine.—It has a slight **astringent** effect on the intestinal mucous membrane.

Blood.—It enters the blood either unchanged or as an aldehyde more readily through the veins than the lacteals. It **binds the oxygen of the oxyhæmoglobin so firmly,** that the latter cannot take up or give off oxygen readily, and thus lessens the oxidising power of the red blood corpuscles and the oxidation in the tissues. As a result of this, there is an imperfect combustion of carbohydrates, and fat is necessarily deposited in the tissues producing **obesity** ; as is often seen in habitual drinkers of extra "pegs." It first increases then reduces the amœboid movements of white corpuscles.

Circulation.—The reflex effects of alcohol on the circulation have already been noted. After absorption, its action is more marked on the heart and circulation. The pulse becomes fuller and stronger, and beats quicker, due no doubt to the increased cardiac activity, and dilatation of the peripheral arteries, from its influence on the **cardiac and vaso-dilator centres.** Hence the **blood pressure rises.** As a result of this activity, the mind becomes exhilarated, muscular power increased, more urine is passed and the skin perspires more freely. This stimulant action does not last long, and is soon followed by **depression,** which is rather persistent. It is therefore a mistake to suppose that alcohol can help a person to perform more bodily work without fatigue.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Respiration.—Alcohol first stimulates and afterwards slows respiration, either by affecting the respiratory or vasomotor centres.

Temperature.—Alcohol is a mild **antipyretic**, due to (*a*) the dilatation of the cutaneous blood-vessels, thereby producing increased perspiration and radiation, (*b*) the diminished oxidation in the tissues, and (*c*) the general depression caused by excessive doses.

Muscular system.—At first, the muscular strength is increased through the increased circulation in the nervous system. In larger doses inco-ordinate movements are produced. In toxic doses, muscular action is entirely suspended.

Nervous system.—In moderate doses, the action of alcohol on the nervous system is one of **stimulation**, due to (*a*) the increased cardiac activity, (*b*) the vascular stimulation, and (*c*) to its direct influence on the nerve cells. In large doses, the stimulation is more pronounced though brief, and soon gives place to depression. In its progressive action, either of stimulation or depression, it follows the "**law of dissolution**" already described in page 158. In other words, the stimulation and subsequent depression proceed from the highest functions of the brain, in a descending scale, to the lowest ones of animal life. Thus, during the stage of stimulation, the imagination becomes brighter, feelings elevated, intellect clearer, (highest functions of the brain) senses more acute, bodily activity more predominant and some of the lower appetites sharpened. The depression follows in the same order, *i.e.* the judgment fails while the imagination, emotions and power of speech are still excited, then the imagination and will-power give way. The patient talks, laughs, sings or cries without restraint, but gradually he loses control over these functions too, his speech becomes thick, incoherent and at last suspended. His muscles next get affected, at first the delicate movements, such as writing, playing on the piano, &c., are abolished, then the other movements become inco-ordinate and paralysed The **reflex centres** in the cord are now involved, he passes stools and urine involuntarily, and finally the **respiratory and cardiac** centres become paralysed, and the patient dies.

Skin.—Alcohol is a mild **diaphoretic**, due partly to the dilatation of the cutaneous blood-vessels and partly to its influence on the sweat-glands. But if it is taken, in larger doses, this dilatation of blood-vessels may proceed to such an extent, that death may follow from excessive radiation of heat, though the drinker may feel a sense of temporary warmth in the beginning, if his cutaneous vessels were contracted previously from cold air.

Kidneys.—Alcohol acts also as a mild **diuretic**, from the dilatation of the renal vessels. A portion of it is excreted in the urine unchanged, if large quantities are taken. Gin has a greater diuretic effect than other spirits.

Elimination.—By far the greater part of alcohol is oxidised

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

as carbonic acid and water: less than 3 p.c. of it is thrown off unoxidised chiefly by the lungs, less by the kidneys and least by the skin.

Acute toxic Action.—A large quantity may cause sudden death either by reflexly arresting the heart's action, or after a short time, by paralysing the respiratory and cardiac centres Symptoms preceding death are generally unconsciousness; fixed, contracted or dilated pupils, weak pulse, cold clammy skin, stertorous breathing, and occasionally delirium or convulsions.

Antidotes.—Emetics or stomach pump. If the patient cannot swallow, coffee with ammonia may be injected by the pump after the stomach has been washed out. Sinapisms, cold affusion, electricity, amyl nitrite inhalation, strychnine $\frac{1}{100}$ gr. to $\frac{1}{50}$ gr. subcutaneously, may be used.

Chronic toxic action or "Alcoholism" is induced by prolonged alcoholic indulgence. Insomnia, muscular tremor, and gastric disturbance are the early symptoms. Gastritis, peripheral or multiple neuritis, cirrhosis of the liver causing ascites, chronic interstitial nephritis causing anasarca, dilatation of the heart, gout, nervous disorders, such as delirium tremens, epilepsy, paralysis, insanity, &c., are the diseases which afflict confirmed drunkards. Generally they are thin, but a few, especially those who drink beer, get fat. They cannot withstand well any serious illness, such as pneumonia, and are particularly liable to attacks of phthisis. Gin drinkers mostly suffer from cirrhosis of the kidneys and liver.

THERAPEUTICS OF ALCOHOL.

Externally.—A continuous local application of a spirituous lotion with a piece of lint or rag, allowing free evaporation,

(*a*) relieves some forms of **headache**;

(*b*) subdues **acute inflammation**;

(*c*) prevents the setting in of or allays **local inflammation**, as in sprains, bruises and boils;

(*d*) hardens the skin and obviates **threatening bedsores** and **cracked nipples**.

Sponging with alcohol and water often relieves the itching of **erythema, urticaria**, &c. Eau-de-Cologne or brandy is often rubbed into the body to check sweating and bring back warmth to the surface, as in **collapse** and **syncope**. Liniments containing alcohol are rubbed into the skin.

(*a*) to aid the absorption of inflammatory products, as in **chronic rheumatism, stiff joints**;

(*b*) to give nutrition to tissues, as in **paralysis**;

(*c*) to counter irritate, as in **catarrh, bronchitis, pneumonia, pleurisy**, &c.; and

(*d*) to relieve pain, as in **myalgia** and **chronic rheumatism**.

Internally. **Mouth.**—As a **local astringent, anodyne** and **antiseptic**, it is used in many mouth and throat diseases. Undiluted brandy held in the mouth relieves **toothache** and the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

pain of **follicular tonsillitis**. The latter disease is also benefited by its astringent and antiseptic properties. Port wine is sometimes used as a **gargle** in **mercurial salivation, sore throat** and **inflamed** and **spongy gums.**

Stomach.—As a **digestive stimulant**, alcohol may be given in small doses just before or during meals in the following class of cases :—

1. Convalescents from acute illness with weakened appetite and digestion.
2. Patients suffering from chronic wasting diseases.
3. Town-dwellers leading a sedentary life.
4. Old and over-worked persons.

In **painful dyspepsia, vomiting of pregnancy** and **flatulence**, champagne or brandy with soda water is sometimes useful. A good peg of whisky or brandy with hot water often relieves **gastric spasms. Fainting, syncope** or **threatening collapse** may be averted by a single large dose of brandy or whisky by reflexly stimulating circulation. **Diarrhœa or cholera** in the beginning may be checked by a stiff dose of brandy.

Heart.—As a **cardiac stimulant**, the effects of alcohol are more persistent than those of ether and ammonia. Hence brandy or whisky is an excellent remedy for threatening **cardiac failure** due to shock, hæmorrhage, febrile and other diseases. In small regularly continued doses, it relieves the distress of **cardiac dilatation** in cases of failing compensation.

Nervous system.—Alcohol must be used with great caution in depressed conditions of the nervous system lest a bad habit be induced. Many nervous diseases do not require any alcohol. In some cases of **insomnia, hysteria** and **neuralgia**, alcohol no doubt affords temporary relief, but it must, if possible, be avoided for fear of generating intemperance. As to the use of alcohol in **acute alcoholism** (delirium tremens), opinions differ. Their use is only justifiable where the stomach cannot retain food, and then in small doses as a sustainer of life.

Kidneys.—Gin is a powerful diuretic, because it contains juniper which is also a diuretic. As alcohol is eliminated by the kidneys, and is an irritant to the mucous membrane of the urethra, it should be avoided in **gonorrhœa, gleet**, &c.

Skin.—Alcohol is rarely used as a diaphoretic, except in cases of **catarrh** or **febrile diseases.**

Fevers.—Opinions are at variance as to the efficacy of alcohol in fevers. Some consider it an essential element in their treatment, while others think it injurious. The following are the indications for its use :—

(1) To strengthen and reduce the frequency of soft and frequent pulse ;
(2) To diminish frequency of respiration ;
(3) To moisten a dry tongue ;

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(4) To lessen delirium and to produce sleep ;
(5) To reduce high temperature ;
(6) To aid digestion ; and
(7) To sustain the heart and nervous system.

If it fulfils these objects it is doing good ; if it does not, then it must be discontinued.

Many cases of fevers do well without alcohol. Experience alone will guide the practitioner when and where to use wines.

Prescribing hints.—It must be borne in mind while ordering alcoholic beverages, that the effects produced are modified by various circumstances such as, (*a*) the amount of volatile ethers they contain ; this is of more importance than the actual alcoholic strength ; (*b*) the degree of their dilution with water ; (*c*) the age, toleration and habits as regards alcoholic drinks of the patient ; (*d*) the amount of exercise taken by him ; (*e*) the condition of his stomach, whether empty or full ; (*f*) the condition of his excretory organs especially the kidneys ; and (*g*) the nature of the diseases for which they are given.

In many exhausting febrile or other diseases, patients can consume without intoxication a large amount of alcohol, even as much as one pint of brandy per diem Sparkling wines (carbonic acid) facilitate absorption and produce a quicker action. Old brandy, whisky or port should be preferred as they contain less injurious ingredients. Different varieties of wines should not be given at the same time as they derange digestion. Small quantities in repeated doses with some easily digestible food are the best method of administration. Debilitated persons do well if an alcoholic drink is given an hour before food. Champagne, port, strong claret or beer may produce burning and aching of the rectum, and new and inferior brandy or whisky headache, because the latter contains fusel oil, furfural and many injurious aldehydes.

ALOE BARBADENSIS.

Barbados Aloes. N.O. *Liliaceæ*.

Syn. I.V.—*Musabár*, Beng. Hind.

Habitat.—West Indian Islands.

Source.—The dried inspissated juice from the transversely cut leaves of *Aloe vera*, *Aloe chinensis* and other species. Known in commerce as *Barbados* and *Curacao Aloes*.

Characters—In yellowish or reddish-brown or almost black hard masses. Fracture either dull and waxy, with opaque splinters; or smooth and glassy, with transparent splinters. Odor disagreeable. Taste nauseous and bitter. *Solubility.*—Almost entirely in alcohol 45 p c. and 75 p.c., in cold water. *Impurities.*—Natal aloes.

Identification.—The general appearance, color and *odor* help recognition, especially the last, which is characteristic, and can be distinctly perceived when the *drug is breathed upon*. It may be mistaken for

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Guaiacum resin which has a greenish tint and no smell ; *Jalap Resin* which has a sweetish odor and acrid taste.

Composition.—(1) *Aloin* (Barbaloin). (2) *Resin.* (3) *Volatile oil.* (4) *Galic acid* a trace.

Action.—A simple purgative. **B.P. Dose.**—2 to 5 grs.

Enters into.—Pil. Cambog. Co., Pil. Colocynth. Co., Pil. Colocynth. et Hyoscyam., and the preparation of Aloinum and the

Official Preparations.

1. **Decoctum Aloes Compositum.—B.P. Dose.**—½ to 2 ozs.
2. **Extractum Aloes Barbadensis.—B.P. Dose.**—1 to 4 grs.
3. **Pilula Aloes Barbadensis.—B.P. Dose.**—4 to 8 grs.
4. **Pilula Aloes et Ferri.—B.P. Dose.**—4 to 8 grs.
5. **Tinctura Aloes.—B.P. Dose.**—½ to 1 dr. for repeated use, and 1½ to 2 drs. for a single dose.

ALOE SOCOTRINA.

Socotrine Aloes. N.O. *Liliaceæ.*

Habitat —Socotra and Zanzibar shipped *via* Bombay.

Source.—Dried juice from the transversely cut leaves of *Aloe Perryi* and probably other species of Aloes. Both the Socotrine and Zanzibar aloes are official.

Characters.—*Socotrine Aloes.*—Viscid, brownish-yellow, or dark-brown or nearly black, hard masses when dry. Fracture dull waxy, uneven. Odor strong, not disagreeable. Taste nauseous, bitter. *Zanzibar Aloes.*—In liver-brown masses ; fracture dull, waxy, nearly smooth, even; odor characteristic ; taste nauseous, bitter. Both varieties are opaque even in small splinters. *Solubility of both varieties.*—Almost entirely in alcohol (45 p.c.) and 1 in 2 of water. *Impurities.*—Borbados and Natal aloes.

Identification.—It is recognised as aloes by the general characters. From Barbados aloes it is destinguished by its *fruity and agreeable odor.* The color of the powder of the two varieties also differs materially. The distinction between Guaiacum and Jalap resins has been adverted to.

Composition.—The same as that of Barbados aloes.

Action.—A simple purgative. **B.P. Dose.**—2 to 5 grs.

Enters into.—Pil. Rhei Co., Tr. Benzoin Co., and the preparation of Aloinum and the

Official Preparations.

1. **Pilula Aloes Socotrinæ.—B.P. Dose.**—4 to 8 grs.
2. **Pilula Aloes et Asafetidæ.—B.P. Dose.**—4 to 8 grs.
3. **Pilula Aloes et Myrrhæ.—B.P. Dose.**—4 to 8 grs.

Non-Official Preparations.

1. **Extractum Aloes Socotrinæ. B.P. 1885.**—*Dose.*—1 to 6 grs.
2. **Tinctura Aloes Co.** *Syn.*—*Elixir ad longam vitam.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ALOINUM.

Aloin. $C_{16}H_{16}O_7$, $3H_2O$.

Source.—A crystalline neutral principle extracted from Barbados and Socotrine aloes. The formula given above is that of Aloin extracted from Barbados aloes.

Aloin is named according to the variety of aloes from which it is extracted, as **Barbaloin, Socoaloin, Nataloin, &c.**

Characters.—Tufts of yellow acicular crystals; inodorous; taste of the aloes. *Solubility.*—Freely in hot water, nearly insoluble in cold.

Action.—Cathartic. **B.P. Dose.**—½ to 2 grs. in pill.

Non-Official Preparation.

1. **Pilula Aloini Co.**—Aloin, Ext. Nucis Vom., Ferri Sulph.; Myrrh., Soap, each gr. ½. Given half an hour before the last meal.

Pharmacology.

Externally.—The activity of aloes is due to its active principle aloin. On the unbroken skin it has no action, but is absorbed from a denuded surface which it stimulates. If sprinkled over an ulcer, it causes purging.

Internally. **Gastro-intestinal canal.**—In minute doses, aloes acts on the stomach as a **stomachic, bitter tonic.** Its action is not so marked on the small intestine, beyond slightly increasing the flow of bile, but it powerfully stimulates the muscular fibres of the colon, and slightly increases its glandular secretion. Therefore, it is a **cathartic,** but its action is slow, taking 10 to 20 hours to purge. Large doses do not necessarily act earlier, but operate more violently and are accompanied by pain griping, tenesmus and even bleeding from the rectum. In moderate doses, the stools are soft, dark-coloured and formed, and in large doses they are liquid. The slowness of its action is believed to be due to the fact that aloin cannot produce catharsis unless it is decomposed in the intestine into a more potent product by admixture with bile. Soap or alkalis combined with it help its solution, and to a certain extent prevent griping. The griping is caused by the irregular contractions of the colon. It increases the vascularity of the rectum, therefore the constant use of aloes may cause hæmorrhoids. When given as an enema, it kills thread worms.

Liver.—According to Röhrig and Rutherford, aloes increases the secretion of bile and is therefore a direct **hepatic stimulant.**

Uterus.—By stimulating the pelvic circulation, aloes acts as an **emmenagogue** (see p. 165). Sometimes it leads to menorrhagia. The writer once treated a case of violent menorrhagia caused by the habitual use of aloes. It may cause abortion.

Elimination.—Aloes is excreted in large quantities with the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

milk, for suckling babies are purged when it is given to their mothers. It is also eliminated to a slight extent with the urine.

Aloin causes less griping. Barbados aloes is slightly stronger than the other varieties.

THERAPEUTICS.

Externally.—The Indian bazar aloes (*musabâr*) with turmeric or opium made into a paste is considered by the natives of India as an effective remedy for contusions and swellings, but it remains to be proved how far it is beneficial in this respect.

Internally. **Gastro-intestinal tract.**—Aloes is reckoned as a **valuable purgative** in **chronic** and **habitual constipation**, for (1) it does not cause after-constipation, (2) gains instead of losing its activity by repetition, (3) improves rather than deranges digestion, (4) stimulates the secretion of bile, and (5) improves the tone of the colon. Aloes is ordinarily given in the form of a pill with rhubarb, nux vomica, ipecacuanha or colocynth. Its griping property is corrected by carminatives and extract of belladonna or hyoscyamus. In minute doses it relieves piles, and in large doses aggravates them. Compound decoction of aloes is a useful preparation for the constipation of children with hard fæces, worms and derangement of digestion, but is unreliable at times. According to Whitla, it may be used to check obstinate **diarrhœa** in adults and children. An enema of aloes may be used as an **anthelmintic**.

Female diseases.—Aloes is given with success in **amenorrhœa** and delayed menstruation, especially when associated with dyspepsia and chronic constipation. For this purpose we use Pil. Aloes et Myrrhæ. When given with iron as Pil. Aloes et Ferri, it is very serviceable in **anæmia, chlorosis** and **amenorrhœa** of young girls.

Caution.—Aloes is contra-indicated in pregnancy; irritable conditions of the pelvic organs, especially rectum, hæmorrhoids, menorrhagia, and during the nursing period of mothers

Prescribing hints.—Aloes is ordinarily given in the form of a pill. Aloin gr. 4, Strychnine Sulph. gr. ¼, Pulv. Ipecac. gr. 6, Ext. Belladonna gr. 1½. M. Divide into 20 pills. One pill daily in habitual constipation after dinner. Extract of liquorice disguises its nauseous taste.

ALSTONIA. Alstonia.

N. O. *Apocynaceæ.* (*Ind. and Col. Addendum*).

Syn. I.V.—*Sapta parna*, Sans. *Chátim*, Beng. *Chátián*, *Sátni*, Hind.

Habitat.—India, Australasia, Eastern Colonies.

Source.—The dried barks of *Alstonia scholaris* and of *Alstonia constricta.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—The *bark of Alstonia scholaris.*—In fragments, $\frac{1}{8}$ to $\frac{1}{2}$ in. thick, spongy, brownish-grey outside, bright buff within; no odor; taste bitter. The bark of *Alstonia constricta.*—In curved pieces or quills, $2\frac{1}{2}$ in. wide, $\frac{1}{3}$ in. thick. Periderm thick, rusty-brown, rugose, reticulated. Internally cinnamon-brown with longitudinal striæ. Odor faint-aromatic. Taste very bitter.

Composition.—The bark contains many alkaloids, the chief being *ditain* from the *dita bark* (A. scholaris) and *Alstonine* from the bark of A. constricta.

Official Preparations.

1. **Infusum Alstoniæ.**—1 in 20, ½ hour. **B.P. Dose.**—½ to 1 oz.
2. **Tinctura Alstoniæ.**—Powdered bark $2\frac{1}{2}$ ozs., Alcohol (60 p.c.) 1 pint. By maceration. **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

Externally.—The milky juice of the plant, or its fresh leaves roasted and made into a poultice, applied to foul ulcers, stimulates them and removes maggots if present.

Internally.—The bark is an **astringent, tonic, antiperiodic and anthelmintic**, being considered very useful in chronic **diarrhœa**, advanced stages of **dysentery** and **catarrhal fever. Ditain** paralyses the motor nerve endings in mammals and has been found successful in the treatment of malarial fevers. Dr. Sharp recently used the bark of *A. constricta* in certain conditions of **typhoid fever** and **influenza** after its febrile stage; and considers it to be an excellent **tonic** possessing the combined properties of quinine and strychnine.

ALUMEN. Alum.

Potassium Alum—$Al_2(SO_4)_3$, K_2SO_4, $24H_2O$.

Ammonium Alum—$Al_2(SO_4)_3$, $(NH_4)_2SO_4$, $24H_2O$.

Syn. I.V.—*Fatkiri*, Beng. *Fitkári*, Hind.

Source.—Prepared by combining aluminium sulphate with potassium sulphate or with ammonium sulphate.

Characters—Colorless transparent, regular octahedral crystals. Taste sweetish, astringent. *Solubility.*—1 in 10 of cold and 1 in 3 of boiling water, freely in glycerin, insoluble in alcohol (90 p.c.) *Impurities.*—Silicates and iron sulphate.

Identification.—Crystals of alum are distinguished by their characteristic shape, exhibiting octahedral facets, the powder is identified by its peculiar sweetish astringent taste.

Incompatibles.—Lime, alkalis, salts of lead, mercury and iron, tartaric acid, tartrates, tannic acid.

Action.—Astringent, emetic. **B.P. Dose.**—5 to 10 grs.

Official Preparation.

1. **Glycerinum Aluminis.**—1 in 6. By trituration and gentle heat if necessary. A local astringent.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ALUMEN EXSICCATUM.

Exsiccated Alum.

Source.—Preparad by heating potassium alum till aqueous vapor ceases to be disengaged, and the salt loses 45 to 46 p.c. of its weight.

Characters.—A white soluble powder absorbing moisture on exposure to air.

NON-OFFICIAL PREPARATIONS AND ALLIED DERIVATIVES.

1. **Lapis Divinus.** *Syn.—Blue Wound Stone.*—Alum, Copper Sulph., Potassium Nitrate, of each 1 oz. Fuse, and when molten, add Camphor 1 dr. Mix and cast into sticks.

2. **Lapis Miraculosus.** *Syn.—Yellow Wound Stone.*—Alum 16, Ferri Sulph. 24, Copper Sulph. 16, Ammon. Chlorid. 1, Verdigris 2. Mix and fuse.

3. **Liq. Alumini Acetici G.P.**—7½ to 8 p.c. of aluminium subacetate. An antiseptic mouth lotion (1 in 8). **Aluminium Aceto-Tartrate** is a better preparation for making lotion.

4. **Aluminii Chloridum.**—A white amorphous deliquescent powder. Relieves the pain of locomotor ataxy. *Dose.*—2 to 4 grs. Its solution (impure) is known as **Chloralum**, a disinfectant.

5. **Alumnol.** *Syn.—Aluminium salt of naphthol-sulphonic acid.*—A whitish soluble powder. A ½ to 2 p.c. lotion is useful in ozœna, pharyngitis, gonorrhœa, leucorrhœa. A 20 p.c. solution is caustic.

6. **Sozal.** See page 181.

7. **Salumin.**—See page 196. 8. **Gallal.**—See Acid Gallic. 9. **Tannal.**—See Acid Tannic. 10. **Ferri Aluminas.**—See Ferrum.

11. **Alsol.**—Aceto tartrate of aluminium ¼ to ½ % solution useful as compress in trachoma, scrophulous ophthalmia.

PHARMACOLOGY.

Externally.—Alum has no action on the unbroken skin, but coagulates the albumen of discharges and tissues. It therefore forms a covering on ulcers and sores, and constricts blood-vessels and arrests bleeding. Hence it is a valuable **local astringent** and **hæmostatic**. Dried alum is a mild **caustic** because it abstracts water.

Internally. **Mouth and throat.**—Alum is a local **astringent** to the mouth and throat, imparting an astringent taste, and a feeling of dryness to the throat.

Stomach and intestine.—In small doses (4 to 8 grs.), it has the same astringent action on the stomach and intestine as on the raw skin, producing **constipation**. Its **hæmostatic action** is now believed to be entirely local, having little effect on remote hæmorrhages. In 30 to 60 grs. it causes **vomiting** by directly stimulating the peripheral nerves of the stomach, and in still larger doses, it is a **gastro-intestinal irritant** causing vomiting and purging. When injected *per rectum*, it kills **thread worms**.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Elimination.—Alum is probably absorbed into the blood as an albuminate, and has no remote action on the tissues in medicinal doses. It is chiefly eliminated with the fæces and partly by the skin and kidneys.

Acute toxic action.—Poisoning by alum is rare. When it occurs, the symptoms are those of gastro-intestinal irritation,—vomiting, purging, &c.

Antidotes.—Emetics or pump. Small doses of sodium carbonate in tepid water decompose alum.

Chronic toxic action.—Anorexia, constipation, gastro-intestinal catarrh are the prominent symptoms.

THERAPEUTICS.

Externally **Skin.**—Being cheap and easily available, alum is used in various minor complaints. In powder or in a concentrated solution, it stops bleeding from **leech bites, wounds,** and **superficial cuts.** Exsiccated alum destroys weak exuberant **granulations.** A weak solution of alum and borax (1 p.c. of each) checks the discharge of **weeping eczema**

Nose.—Its solution makes a useful **collunarium in ozœna.** Powdered alum either sniffed up or blown in by means of a paper funnel, or its lotion (10 grs. in 1 oz.) injected into the nostrils, arrests **epistaxis.**

Eyes.—Alum makes a useful **collyrium** (4 to 8 grs. in 1 oz) for ordinary or purulent **conjunctivitis.**

Genitals.—It makes a capital wash (1 dr. in 1 pint) for **vulvitis of children,** if the parts are frequently irrigated and a piece of lint soaked in the lotion is left in situ. It also relieves **pruritus.** A douche (10 grs. to 1 oz) removes **leucorrhœa,** checks slight **hæmorrhage** from **patulous os** after abortion or delivery, and benefits **prolapsed uterus** A weak solution (3 grs. in 1 oz.) is successfully employed in **gonorrhœa** as an injection.

Rectum.—A daily wash with a solution of alum (6 grs. in 1 oz.) after defæcation benefits **prolapse of the rectum and hæmorrhoids.**

Internally. **Mouth.**—Alum is commonly used as a dentifrice in **ulcerated and spongy gums.** A solution (5 to 10 grs. in 1 oz.) is a useful gargle in **sore throat, elongated uvula, tonsillitis, salivation** and **apthous** and **ulcerative stomatitis,** but Glyc. Aluminis is a better application in these cases. Dusting with dried alum is sometimes used as a solvent for **diphtheritic** and **croupous false membranes.** In the form of a spray, alum may be employed in **hoarseness** and **chronic coughs.**

Stomach and intestine.—Alum is considered to be an efficient non-depressant **emetic** in **croup** and **bronchitis** Meigs uses 1 dr. of alum with honey or syrup every 10 or 15 minutes

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

till the child vomits. By lessening the congestion of the stomach caused by constant coughing, it is said to control the **vomiting of phthisis and pertussis.** As an astringent, it is used in **chronic diarrhœa and dysentery,** and as a local hæmostatic in **gastro-intestinal hæmorrhage.** Alum-whey obtained by curdling 1 pint of milk with 2 drs. of alum may be given with benefit in enteric and other **diarrhœas.** In 30 gr. doses frequently repeated, it relieves **lead colic** by opening the bowels and precipitating lead salts as insoluble lead sulphates.

Lungs.—Alum is vaunted as a remedy for **whooping cough** but it is doubtful whether it is really of any use in this disease. It is said that 10 grs. of powdered alum placed dry on the tongue sometimes checks a fit of **asthma.**

AMMONIACUM.

Ammoniacum. N.O. *Umbelliferæ.*

Habitat.—Persia, the Punjab.

Source.—A gum-resin exuded from the flowering and fruiting stems of *Dorema ammoniacum*, and probably other species.

Characters.—In pale yellowish or brownish tears, or in nodular masses; ¼ to 1 in. in diameter; hard, brittle when cold, having a waxy lustre in freshly-fractured surface; soft when warmed. Internally opaque from milk white to brownish-yellow. Odor faint, characteristic, but not alliaceous. Taste bitter, acrid. Forms a white emulsion with water.

Identification.—It resembles *galbanum*, *benzoin* and *asafetida*, from which it can be distinguished by its odor, and the following test:—If a small fragment be heated to redness in a dry test-tube, the contents of the tube, after cooling, yield with boiling water a solution which when largely diluted with water and made alkaline with ammonia solution, does not exhibit a blue fluorescence (distinction from asafetida and galbanum).

Composition.—(1) *Gum* 20 p.c. (2) *Resin* 70 p.c. (3) *Volatile oil* 4 p.c.

Action.—Stimulant expectorant. **B.P. Dose.**—5 to 15 grs.

Enters into.—Pil. Ipecac. c. Scilla, Pilula Scillæ Co., and the

Official Preparations.

1. **Emplastrum Ammoniaci cum Hydrargyro.**—12 in 15.
2. **Mistura Ammoniaci.**—13½ grs. in 1 oz. A milk-like emulsion. **B.P. Dose.**—½ to 1 oz.

Pharmacology.

Externally.—Applied locally, ammoniacum gently stimulates the blood-vessels and nerves of the part, thereby promoting the absorption of morbid products. It is therefore a **resolvent.** This action is greatly augmented when it is combined with mercury, as the B. P. ammoniacum and mercury plaster, which, if applied for any length of time, gives rise to a sort of rash.

Internally.—Like oleo-resins and aromatics, it is excreted by

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the bronchial glands, stimulating and disinfecting their secretion. Hence it is a **remote stimulating disinfectant expectorant.** In large doses it is a laxative.

THERAPEUTICS.

Externally.—As a *resolvent* the plaster is employed in **sympathetic buboes, enlarged and indolent glands,** and **chronic inflammatory joint diseases,** such as synovitis, rheumatic swellings, &c.

Internally.—Ammoniacum is a valuable remedy for **chronic bronchitis** of the old and emphysematous. In 10 to 30 gr. doses three or four times a day, it loosens adhesive mucus, checks wheezing and facilitates expectoration.

AMMONII BENZOAS. See Benzoinum.

AMMONII BROMIDUM. See Bromum.

AMMONIUM. Ammonia.

Source.—Ammonia is chiefly obtained from the liquor of the gas-works, and from iron-smelting furnaces and paraffin shale, and purified.

AMMONIÆ LIQUOR FORTIS.

Strong solution of Ammonia. NH_3.

Source.—An aqueous solution obtained by heating a mixture of ammonium chloride and slaked lime, and passing the gas (ammonia) into distilled water. Contains 32½ p.c. of NH_3 by weight.

Characters.—A colorless, alkaline liquid; odor characteristic, very pungent. Sp. gr. 0·891. *Impurities.*—Chloride, sulphide, and sulphate of ammonia, lime metals.

Identification.—The characterstic odor helps diagnosis.

Action.—Vesicant.

Enters into.—Lint. Hydrag., Tr. Guaiac. Ammon., and in the preparation of Ammon. Benz., Ammon. Brom., Ammon. Phosph., and the

OFFICIAL PREPARATIONS.

1. **Liquor Ammoniæ.**—10 p.c. by weight. *Enters into.*—Tr. Ergot. Ammon., Tr. Opii Ammon., Tr. Quin. Ammon., Tr. Valer. Ammon., and—

(*a*) **Linimentum Ammoniæ.** *Syn.—Hartshorn Liniment.*—1 in 4. Ammonia soap is formed by the mixture.

2. **Linimentum Camphoræ Ammoniatum.**—1 in 20.

3. **Spiritus Ammoniæ Aromaticus.**—See Ammon. Carb.

4. **Spiritus Ammoniæ Fetidus.**—1 in 10. **B.P. Dose.**—20 to 30 ms. for repeated use, and 60 to 90 ms. for a single dose.

NON-OFFICIAL PREPARATIONS.

1. **Lotio Crinalis.**—Ol. Amygdal. 1, Liq. Ammon. Fortis 1, Sp. Rosmarini. 4, Aq. Mollis 2. Mix.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. **Tr. Ammoniæ Comp.** *Syn.— Eau de Luce.*—Mastic 2 drs. Alcohol (90 p.c.) 9 drs, Ol. Lavand. 14 ms., Liq. Ammon. Fort. 20 ozs. Dissolve. A local application to snake bite.

PHARMACOLOGY.

Externally.—A solution of ammonia when rubbed in or applied to the skin stimulates the peripheral nerves and superficial blood-vessels, producing a sensation of heat and redness. If it is concentrated and evaporation prevented, it blisters. Ammonia is therefore a **rubefacient** and **vesicant.**

Nose and air-passages.—The vapor of ammonia powerfully **irritates** the mucous membrane of the nose and air-passages causing sneezing. It also irritates the conjunctiva producing lachrymation By exciting the nasal afferent nerves, it **reflexly stimulates circulation,** and accelerates pulse-beat. If the inhalation is prolonged or the vapor is too concentrated, inflammation of the nasal and air-passages results

Internally.—On reaching the stomach, ammonia at once **reflexly stimulates the heart and circulation** by its action on the accelerator centre. After absorption this action is continued and **respiration is accelerated.** Like other alkalis it neutralises the acidity of the gastric juice if given after food and increases the flow if given before. It also increases peristalsis and causes a sense of warmth in the stomach. Therefore, it is an **antacid, gastric stimulant** and **carminative.** In large doses, it is a **gastro-intestinal irritant**

Blood.—Ammonia slightly increases the alkalinity of the plasma, and is supposed to lessen the coagulability of the blood, and to dissolve any clot that may have already formed.

Heart.—Its action is stimulated reflexly as well as after absorption by excitation of the accelerator centre.

Lungs.—Respiration is increased by direct stimulation of the **respiratory centre** after absorption. Ammonia is partly eliminated by the bronchial glands, whose secretion it increases. Rossback found that after applying a weak solution to the mucous membrane of the trachea of a living animal, there was a decided congestion of the surface with increased mucous discharge.

Nervous system.—Ammonia is a **general stimulant,** because it stimulates the respiratory and accelerator centres. It has no action on the brain. It acts on the nerves when locally applied, causing tingling and burning. In toxic doses, it produces convulsions owing to the stimulation of the motor cells in the cord.

Kidneys.—Ammonia and its salts are decomposed in the blood and tissues, the chief changes probably take place in the liver, and the ultimate result is urea, uric acid, and nitric acid. Therefore (N.B.) ammonia **increases the acidity of the urine.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Elimination.—Ammonia is thrown off with the breath, sweat, urine and bronchial secretion.

Toxic action.—If a large dose of a concentrated solution be swallowed, it may cause death within a few minutes from suffocation due to spasm of the glottis. Otherwise, the symptoms are those of poisoning by a corrosive alkali.

Antidotes.—The same as those of the other alkalis.

THERAPEUTICS.

Externally.—As a *local stimulant* to nerves and blood-vessels, the liniment of ammonia is rubbed into **stiff joints**, and in various conditions of **chronic rheumatism**; and as a *counter-irritant* on the chest in **bronchitis, pneumonia** and **pleurisy.** Ammonia may be used as a *vesicant* in cases where cantharides is contra-indicated. A piece of lint cut slightly larger than the intended blister is moistened with the strong solution and applied, and immediately covered over with a watch glass. Ammonia neutralises the poison of **nettles** and **insect-bites** and thereby lessens the pain and swelling caused by them. A hypodermic injection of compound tincture of ammonia has been found efficacious in the **bites of less poisonous snakes.** Lotio Crinalis is an excellent application for promoting the growth of the hair.

The vapor (smelling salts) is used to rouse patients from fainting, shock, syncope, and stupor and narcotic poisoning.

Internally.—Like other alkalis, ammonia may be given in **acid dyspepsia.** Spirit of sal volatile is a useful remedy for **gastric and intestinal cramps**; a few drops with soda and dill water giving relief to **flatulence** in infants. As a general diffusible stimulant, ammonia is extremely serviceable in **syncope, shock, fainting,** and in the low adynamic conditions of **febrile diseases, pneumonia, phthisis,** &c. It makes an excellent "pick-me-up". It softens the phlegm in bronchitis and catarrhal pneumonia, but the carbonate is better. Ammonia controls *iodism*, and is therefore combined with iodides, when prescribed in large doses.

AMMONII CARBONAS. Ammonium Carbonate.

Syn.—Ammonium Sesquicarbonate.

Source.—A variable mixture of ammonium hydrogen carbonate NH_4HCO_3 with ammonium carbamate $NH_4NH_2CO_3$, obtained by subliming ammonium sulphate or chloride with calcium carbonate; thus $2CaCO_3+4NH_4Cl=N_3H_{11}C_2O_6+2CaCl_2+H_2O+NH_3$.

Characters.—In volatile, translucent, crystalline masses; odor ammoniacal; reaction alkaline. Effloresces when exposed to air. *Solubility.*—1 in 4 of cold water. *Impurities.*—Sulphates and chlorides.

Identification.—The odor and the translucent appearance, particularly when freshly broken, help recognition. A white powdery coating forms on samples exposed to air.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Incompatibles.—Acids, acid salts, lime water, iron salts, alkaline earths and alkaloids.

Dispensing hints.—The powdery coating should be scraped off before dispensing.

Action.—Antacid, stimulant, expectorant, emetic. **B.P. Dose.**—3 to 10 grs. as a stimulant and expectorant; 30 grs. as an emetic.

Enters into.—The preparation of Ammonium Chloride, Bismuth Carb., Ferri Carb. Sacch., and the

Official Preparations.

1. **Liquor Ammonii Acetatis.** *Syn.—Spirit of Mindererus.*—Stimulant, diuretic, diaphoretic. Should be *neutral* or slightly acid. Stock in green bottles. **B.P. Dose.**—2 to 6 drs.

2. **Liquor Ammonii Citratis.**—About 16 p.c. Diuretic, diaphoretic. Stock in green bottles. **B.P. Dose.**—2 to 6 drs.

3. **Spiritus Ammoniæ Aromaticus.** *Syn.—Spt. Ammon. Com., Spirit of Sal Volatile.*—Cardiac stimulant. **B.P. Dose.**—20 to 40 ms. for repeated use, 60 to 90 ms. for a single dose. Should not be prescribed with Syrupus Scillæ.

Non-Official Preparations and Derivatives.

1. **Liq. Ammon. Acet. Fort., B.P. 1885.**—1 with 5 of distilled water forms the official diluted Liq Ammon. Acet. *Dose.*—25 to 75 ms.

2. **Liq. Ammon. Citratis Fort., B. P. 1885.**—1 to 3 of distilled water forms the official Liq. Ammon. Citratis. *Dose.*—30 to 90 ms.

3. **Ammonii Bicarbonas.**—More palatable and less caustic. Suitable for effervescing draughts. *Dose.*—3 to 10 grs.

4. **Ammonii Fluoridum.**—In enlarged spleen. *Dose.*—5 to 20 ms. of the solution (4 grs. in 1 oz.).

5. **Ammonii Picras.**—In yellow scales soluble in water. In ague and malarial fevers. *Dose.*—½ to 1½ grs., 4 or 5 times daily.

6. **Ammonii Tartras.**—Expectorant. *Dose.*—5 to 30 grs.

7. **Smelling Salts.**—There are several kinds. The following is a sample of **inexhaustible salts**:—Ammon. Chloride 1½ ozs., Pot. Carb. 1 oz. 6 drs., Camphor 1 dr., Ammon. Carb. 3 drs., Oil of Cloves 10 ms., Oil of Bergamot 10 ms., Oil of Spearmint 4 ms. Powder the solids and mix the oils.

8. **Pick-me-up.**—Spt. Ammon. Arom, ½ dr., Spt. Chlorof. ½ dr., Tr. Gentian Co. 1 dr., Tr. Card. Co. 2 drs., Syrup 2 drs., Aq. ad. 2 ozs. M. for a dose.

Pharmacology and Therapeutics.

Externally.—Ammonium carbonate is never used externally though it has the same actions as those of Liqr. Ammonia. Spirit Ammon. Aromat. is inhaled for reflex stimulation.

Internally.—The carbonate possesses all the virtues of the Liquor, and in addition is a **powerfully stimulating expectorant**, facilitating the expulsion of viscid mucus. It is therefore very useful in **bronchitis**, and **catarrhal pneumonia**. It is an **emetic** in ½ dr. doses, though rarely used for that purpose.

In large doses (20 to 30 grs.) it acts also as a **purgative**.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Sometimes, even in small repeated doses if continued for long, it **irritates the bowels.** The carbonate should not therefore be given in cases complicated with **diarrhœa.**

The solutions of the acetate and citrate are **diaphoretics,** acting possibly either on the secreting cells or on the periphery of the secreting nerves of the sweat-glands (see p. 148), but the acetate appears to be more powerful. If the patient is kept cool, their action concentrates upon the kidneys and produces diuresis. For these actions, they are used as mild, non-depressant **antipyretics in fevers.** They are also given to counteract the effects of immoderate indulgence in alcohol.

Prescribing hints.—The carbonate is best given well diluted in milk, or syrup and water. Liqr. Ammon. Acetat. 2 ozs., Pot. Acetas. 2 drs, Spt. Æther., Nitrosi 4 drs., Syrup and water to 8 ozs. make a good non-depressant **diaphoretic mixture,** which may be used in any **febrile disease.** Liqr. Ammon. Acetat. 2 ozs., Ammon. Carb. 40 grs., Pot. Iodide 16 grs, Vin. Antim. 40 ms, Syrup and water to 8 ozs. make a capital mixture for **catarrhal pneumonia.**

AMMONII CHLORIDUM.

Ammonium Chloride. NH_4Cl.

Syn.—Sal Ammoniac. **Syn. I.V.**—*Nishedal*, Beng. *Noshádar*, Hind.

Source.—Prepared by neutralising crude solution of ammonia or ammonium carbonate with hydrochloric acid. Thus $NH_4HO + HCl = NH_4Cl + H_2O$.

In India this is manufactured from a peculiar clay found at Karnal in the Punbjab and is easily obtainable in the bazars.

Characters.—In colorless, inodorous crystals. *Solubility.*—1 in 3 of cold water, 1 in 60 of alcohol (90 p.c.). *Impurities.*—Iron, lead, and tarry matters.

Identification.—The peculiar fibrous, translucent appearance helps recognition.

Incompatibles.—Alkalis and their carbonates, alkaline earths, lead and silver salts.

Dispensing hints.—It is not easy to powder ammonium chloride, and is best done by dissolving the salt in hot water and evaporating the solution to dryness with constant stirring (see p. 11). The powder is granular and cannot be recognised.

Action.—Hepatic stimulant, expectorant. **B.P. Dose.**—5 to 20 grs.

Enters into.—The preparation of Liqr. Ammon. Fort.

Non-Official Preparations.

1. **Lotio Evaporans.**—Ammon. Chloride. ½, Spt. Rect. 2, Water to 12. Dissolve.
2. **Lotio Refrigerans** (Sir A. Cooper).—Ammon. Chlorid. 5, Pot. nitras 5. Water 16. Dissolve.
3. **Troch. Ammon. Chlor.**—2 to 3 grs. in each. In bronchitis.
4. **Vapor. Ammon. Chlor.**—Obtained by mixing hydrochloric

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

acid and ammonia in a suitable-apparatus and purifying through water or moist sponge. A useful inhalation in bronchitis.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—A solution of ammonium chloride has a **soothing refrigerant** effect when locally applied, and this is greatly increased by the addition of alcohol and potassium nitrate Hence, the evaporating and cooling lotions are useful in sprains, bruises, fractures, dislocations, headache, cerebral congestion, apoplexy, &c. They may also be applied to threatening mammary abscess and glandular inflammations In the form of an inhalation, ammonium chloride increases the secretion of mucus from the pharynx, larynx, trachea, bronchi and eustachian tubes, and is therefore serviceable in chronic **pharyngitis, laryngitis, bronchitis** and **otitis media.**

Internally. **Gastro-intestinal canal.**—Ammonium chloride when allowed to melt slowly in the mouth acts as a **reflex expectorant.** In moderate doses 10 to 15 grs., it is a **gastro-intestinal stimulant** particularly to the intestine. It is an excellent remedy for **gastric catarrh.** It is said to relieve the vomiting and heart-burn due to cancer of the stomach.

Liver.—It stimulates the secretion of **bile** (see p. 131) and is used in **catarrhal jaundice,** subacute and chronic **congestion, enlargement** and **threatening abscess** of the liver.

Lungs.—It is a stimulating **expectorant** whether given internally or by inhalation, and is serviceable in **bronchial catarrh** without fever. 10 grs. dissolved in about 3 ozs. of cold water, sipped frequently, relieves the distressing fits of coughing in bronchitis.

Nervous system.—It is not a cerebral stimulant. In 30 gr. doses it sometimes relieves **migraine, clavus hystericus, myalgia, sciatica** and **intercostal** and **hepatic neuralgia.** As an alterative it is sometimes given in **gout** and **rheumatism.**

Kidneys.—It has feeble **diuretic** properties, and is given in **dropsy** caused by hepatic disorders.

Prescribing hints.—It may be given in powder, compressed tablets, lozenges or in a mixture, Its taste is best disguised by chloroform and syrup or extract of liquorice. (See p. 116.) In the absence of an inhaler, the vapor produced by simply heating ammonium chloride on a dish may be inhaled.

AMMONII PHOSPHAS.

Ammonium Phosphate. $(NH_4)_2HPO_4$.

Source.—Obtained by neutralising solution of ammonia with phosphoric acid; thus $2NH_4OH + H_3PO_4 = (NH_4)_2HPO_4 + 2H_2O$.

Characters.—Transparent colorless prisms. *Solubility.*—1 in 4 of water, insoluble in alcohol (90 p.c.).

Action.—Direct cholagogue, diuretic. **B.P. Dose.**—5 to 20 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY AND THERAPEUTICS.

Internally —It is a direct **hepatic stimulant**, and diuretic. It decomposes the insoluble urate of sodium and forms soluble ammonium urate and sodium phosphate ; and is therefore recommended in **gout** and **uric acid diathesis.**

AMYGDALA AMARA.

Bitter Almond. N.O. *Rosaceæ.*

Syn. I.V.—*Tikta bádám* Beng., *Korwá bádám* Hind.

Source.—The ripe fruit of *Prunus Amygdalus, var. Amara.*

Characters.—Resembles the sweet almond in appearance, but shorter and broader ; taste bitter. Its aqueous emulsion emits the characteristic odor.

Composition.—(1) *Purified fixed oil.* (non-poisonous) 50 p.c. (2) *Emulsin* or *synaptase* an albuminoid ferment. (3) *Amygdalin* a crystalline glucoside, which in the presence of water and emulsin is decomposed into *hydrocyanic acid, glucose,* and an *essential oil*—oleum amygdalæ amaræ. The pure essential oil is non-poisonous but an artificial oil—Benzaldehyde prepared from Toluone—is often sold in its stead.

AMYGDALA DULCIS.

Sweet Almond.

Source.—The ripe seed of *Prunus Amygdalus, var. Dulcis.* known in commerce as the Jordan almond.

Characters.—About 1 in. long, oblong, compressed, acute at one end, rounded at the other. Testa brown, thin, rough. Cotyledons two, oily, exalbuminous. Its aqueous emulsion does not emit any odor. *Impurity.*—Bitter almond.

Composition.—(1) *Fixed oil,* 50 p.c. (2) *Emulsin* and other albuminous products.

OFFICIAL PREPARATIONS.

1. **Mistura Amygdalæ.**—1 in 8. **B.P. Dose**—½ to 1 oz.
2. **Pulv. Amygdalæ Compositus.**—8 in 13. *Dose.*—60 to 120 grs.

NON-OFFICIAL PREPARATIONS.

1. **Almond Cosmetic Cream.**—Blanched Almond 1 oz., Rose Water 4 ozs. Make a paste.

OLEUM AMYGDALÆ.

Almond oil.

Source—The oil expressed from the bitter or sweet almond.

Characters.—Pale yellow, nearly inodorous, with a bland nutty taste. Sp. gr. 0·915 to 0·920. *Solubility.*—In ether, chloroform, slightly in alcohol (90 p.c.). *Impurities.*—Peach-kernel oil and apricot-kernel oil.

Action.—Emollient, demulcent, laxative. *Dose.*—1 to 4 drs.

Enters into.—Lint. Ammon., Ol. Phosph., Ung. Aquæ Rosæ, and Ung. Cetacei.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparation.

1. **Lime Juice and Glycerin.**—Almond Oil 3½ drs., Oil of Lemon 1 dr., Lime-water to 8 ozs. Mix by shaking. Glycerin 1 dr. may be added to justify the name. A popular preparation for the hair.

Pharmacology and Therapeutics.

Externally.—A paste of sweet almond is a **demulcent and emollient**, and is used as a cosmetic. Indian ladies make a paste with cream of milk. Almond oil being a bland oil makes a good basis for many hair-oils and ointments. It is a soothing application for **chapped hands, excoriations** and **irritable skin diseases.** The Mistura Amygdalæ Amaræ made in the same way as Mist. Amygdalæ may relieve itching of the skin.

Internally.—Sweet almond is **nutritive.** Its flour being devoid of starch is given to diabetic patients as a substitute for starchy food, the only objection to its use being its high price. The flour of Brazil nuts may be used as a cheaper substitute, but is not so palatable. The almond mixture and compound powder are agreeable vehicles for suspending insoluble drugs.

The oil is a mild **purgative** in 2 to 4 dr. doses. An **enema** of 1 to 3 pints of the oil has been found effective in impaction of fæces and obstruction of bowels.

AMYL NITRIS.

Amyl Nitrite.

Source.—Obtained by the interaction of amylic alcohol which has been distilled between 262° and 270° F. and nitrous acid. Consists chiefly of iso-amyl nitrite $C_5H_{11}NO_2$, but contains other nitrites of the homologous series.

Characters.—A yellowish ethereal liquid; odor fragrant; reaction faintest acid; sp. gr. 0·870 to 0·810; *very volatile. Solubility.*—In alcohol (90 p.c.) and almost insoluble in water. *Impurities.*—Free acid and amyl nitrate.

Identification.—Its fragrant odor resembling that of the *champa plantain* of Bengal or the ripe pineapple helps recognition.

Dispensing hints.—As the drug is *extremely volatile* it should be kept in hermetically sealed bottles in a cool place. Agitation or heat helps evaporation

Action.—Arterial dilator and cardiac accelerator. **B.P. Dose.**—1 to 5 ms. for inhalation. ½ to 1 m. by the mouth.

Non-Official Preparations.

1. **Amyl Nitrite Capsules.**—Glass capsules containing 1, 2, 3 or 5 ms., encased in cotton wool and silk. Before use the capsule is broken within a handkerchief and inhaled.

2. **Iso Butyl Nitrite** may be used as a substitute for amyl nitrite.

3. **Tertiary Amyl Nitrite.** *Syn.—Bertoni's Ether.*—Possesses all the properties of amyl nitrite, but may be taken in larger doses, and does not produce flushing of the face.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY.

Externally.—Amyl Nitrite is a direct local **depressant** to the sensory nerves, but the action is transitory.

Internally. **Blood.**—It enters the blood readily through the lungs and stomach, and circulates as a sodium nitrite. If absorbed in sufficient quantity, it converts the hæmoglobin into methæmoglobin and another body—nitric oxide hæmoglobin—and renders the arterial and venous blood chocolate coloured, and thereby interferes with the oxidising property of the corpuscles. In ordinary doses the effect is slight and the methæmoglobin is soon de-oxidised, but in toxic doses these changes are enough to kill. The inhalation of oxygen soon reconverts methæmoglobin.

Heart and blood-vessels.—Within a minute of inhalation, face, head and neck become warm and flushed, the carotids and their branches throb, head feels full and tense, and **heart beats rapidly and violently**, soon followed by headache, giddiness, rapid breathing and dilatation of the pupils. If the dose is large, the **arterioles of the whole body dilate**, as the result of weakening or paralysis of their muscular coats, for the dilatation occurs if the cord is destroyed. Hence the **blood-pressure** and **arterial tension are greatly lowered**. The **acceleration of the pulse-beat** without any increase of its force is due to the depressed condition of the vagal roots owing to the diminution of the blood-pressure. In toxic doses the heart may stop in diastole on account of direct action on the cardiac muscle.

Lungs.—Respiration is at first quickened by stimulation of the respiratory centre, later on it becomes labored and difficult, and finally ceases altogether when the centre becomes asphyxiated.

Nervous system.—Most of the nervous symptoms, such as headache, giddiness, throbbing in the head, dilatation of pupils &c, are due to the dilatation of the arterioles of the brain and cord. In large doses reflex action is abolished owing to the profound paralysis of the motor centres in the cord. The functions of the sensory and motor nerves are affected a few minutes before death.

Temperature.—Under the influence of amyl nitrite the temperature falls considerably both in health and fever. This is due to peripheral vascular dilatation and diminished metabolism.

Urine.—It escapes with the urine as nitrites and nitrates, and is a feeble **diuretic**. It may produce **glycosuria**, possibly by dilatation of the hepatic blood-vessels.

THERAPEUTICS.

Inhalation.—The profession first learned the use of amyl nitrite in **angina pectoris** from Dr. Brunton who, seeing that it dilated the arterioles, used it in this disease with startling effects. Five drops give speedy relief, especially if the disease is paroxysmal. It may even afford relief to angina when there is no vaso-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

motor contraction. In fact, it relieves, though temporarily, any **cardiac pain**, of paroxysmal nature. The pain of **thoracic aneurism** is often allayed by it. The "flushing" or "heat" which many females experience during the menopause may be controlled by this drug. It may arrest a fit of **epilepsy** if inhaled as soon as the aura is perceived, and may cut short a fit of **ague** if inhaled at the beginning of the cold stage In **migraine** due to spasm of the blood vessels of one side of the face, as indicated by the paleness of the affected side, inhalation of amyl nitrite gives relief. It has been found useful in **syncope, fainting, suspended animation** as in drowning and hanging, and **chloroform** and **opium poisoning.**

It has been found efficacious in uncomplicated **asthma**, relieving dyspnœa within a short time. It also temporarily affords relief to **cardiac dyspnœa** accompanied by anasarca, caused by dilated and hypertrophied heart. It is useful in **sea-sickness.** It may relieve the pain of **dysmenorrhœa**, relax **uterine spasms** and arrest the fits of **eclampsia.** It has been suggested for employment in **tetanus** and **strychnine poisoning.**.

Caution.—It should be used with great caution in sensitive and nervous persons, who are powerfully affected by it. It should not be administered to persons suffering from aortic diseases, or those whose arteries are atheromatous, or to those who are emphysematous, plethoric or suffer from chronic bronchitis.

Prescribing hints.—Inhalation is the usual method, though it may be given by the mouth and subcutaneously. The drug may be poured on a handkerchief or a **glass capsule** broken within its folds and inhaled. By the mouth, it is best given diluted with brandy on sugar, or suspended by mucilage in a mixture. The glass capsules keep better in India. Patients may become habituated to its use, so that after a while it has to be inhaled several times before it gives relief.

AMYLUM. Starch.

N.O. *Graminaceæ.*

Syn. I V.—*Shetsár*, Beng.

Source.—Prepared from the grains of common wheat, *Triticum sativum:* maize, *Zea Mays;* and rice, *Oryza sativa.*

Characters.—In fine powder or masses, white inodorous.

Incompatible.—Iodine.

Enters into.—The preparation of Pulv. Tragacanth. Co. and the

Official Preparation.

1. **Glycerinum Amyli.**—1 in 8, or 1 in 10½ by weight. See pp. 27.

Pharmacology and Therapeutics.

Externally.—Starch is bland and non-irritating and may be used as a **protective and absorbent in weeping eczema,**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

excoriated and inflamed surfaces, as slight burns. In the form of Violet Powder, which is merely perfumed starch, it is used to prevent chafing or excoriation of the skin of infants. Generally it is used as a basis for dusting powders and insufflations. Glyc. Amyli is a good application for chilblains and chapped hands.

Internally.—It is a food, and an antidote for poisoning by iodine. Mucilage of starch (1 in 40) is used for preparing enemas.

ANDROGRAPHIS. Andrographis.

N.O. *Acanthaceæ.* (*Ind. and Col. Addendum.*)

Syn.—Creat. **Syn. I. V.**—*Kálmeg*, Beng. *Kreat*, Hind.

Habitat.—India, Eastern Colonies

Source.—The dried plant of *Andrographis paniculata.*

Characters.—*Stem.*—1 to 3 ft. high, quadrangular, slightly winged, longitudinally furrowed, color dark green. *Leaves.*—Opposite, shortly petioled, lanceolate, entire; upper surface dark green, shining; lower surface granular. They vary in size. *Flowers.*—Calyx, small, hairy, five-cleft; capsules cylindrical, two-valved. *Root.*—Simple, fusiform, woody. No odor in dried plant. Taste intensely bitter.

Composition.—(1) A non-basic *bitter principle.* (2) *Tannic acid.* (3) *Sodium chloride.*

Official Preparations.

1. **Infusum Andrographis.**—1 in 20. Andrographis cut small 1 oz., distilled boiling water 1 pint. Infuse for 15 minutes. **B.P. Dose.**—½ to 1 oz.

2. **Liquor Andrographidis Concentratus.**—1 in ⅝. Andrographis 10 ozs., Alcohol (20 p.c.) 25 ozs. By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

3. **Tinctura Andrographidis.**—1 in 10. Andrographis 2 ozs., Alcohol (60 p.c.) *q. s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Tr. Andrographidis Co., I.P.**—Andrographis cut small 6 ozs., Myrrh 1 oz., Aloes 1 oz., Proof Spirit *q.s.* to 40 ozs. Macerate for 7 days. Useful in constipation and torpidity of the liver.

2. **Pilula Andrographidis Co.** (*Alui.*)—Caraway fruits, *rádhuni* (*Ptychotis involucrata*), anise, cloves, and pericarps of greater cardamoms, of each equal parts. Make a pill-mass with the *juice* of Andrographis and divide into pills of the size of a pea. An Indian domestic remedy administered with human milk in infantile diseases.

Pharmacology and Therapeutics.

Internally.—Andrographis is a bitter, stomachic, tonic, anthelmintic and febrifuge, generally employed in children's ailments; such as flatulency, diarrhœa, dysentery, loss of appetite, &c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Drs. Carter, Dymock and Arjun reported on the drug as being a bitter tonic and stomachic, useful in general debility, convalescence after fevers and advanced stages of dysentery. As a tonic, stimulant and gentle aperient they consider it useful in dyspepsia and torpidity of the alimentary canal.

In short Creat possesses properties almost similar to those of Quassia.

ANETHI FRUCTUS.

Dill Fruit. N.O. *Umbelliferæ.*

Syn. I. V.—*Soyá* or *Sowá*, Hind.

Habitat.—Middle and Southern Europe and Tropical India.

Source.—The dried ripe fruit of *Peucedanum graveolens.*

Characters.—The fruit consists of two mericarps freed from pedicel. Each is broadly oval; $\frac{1}{8}$ in. long and $\frac{1}{12}$ in. broad; compressed dorsally; brown: dorsal ridges inconspicuous, but lateral ones prolonged into *wings.* Each mericarp exhibits 6 vittæ. Odor and taste aromatic.

Identification.—It resembles *Anise, Fennel, Caraway* and *Conium*, from which it is distinguished by the presence of *wings.*

Composition.—The *Volatile oil*, official (*q.v.*).

Action.—Carminative.

Official Preparation.

1. **Aqua Anethi.**—*Dose.*—$\frac{1}{2}$ to 2 ozs.; 1 to 2 drs. for a child 1 year old.

OLEUM ANETHI. Oil of Dill.

Source.—Obtained by distilling dill fruit.

Characters.—Color pale-yellow; odor that of the fruit; taste sweet, aromatic; sp. gr. 0·905 to 0·920. *Solubility.*—In alcohol and ether. **B.P. Dose.**—$\frac{1}{2}$ to 3 ms.

Composition.—(1) A *Terpene* (limonene). (2) *Carvol.*

Pharmacology and Therapeutics.

The oil of dill fruit is an **aromatic, stimulant, antiseptic and carminative**, and is used to relieve **flatulency** and **intestinal colic.** It corrects the griping of purgatives. Dill Water is chiefly used to remove flatulency in children.

ANISI FRUCTUS.

Anise fruit. N.O. *Umbelliferæ.*

Syn I.V.—*Mouri*, Beng. *Sonf*, Hind. *Anisum*, Bom.

Habitat.—Central and Southern Europe and Northern India.

Source.—The dried ripe fruit of *Pimpinella anisum.*

Characters.—Ovoid, laterally compressed, covered with hairs, greyish-brown, $\frac{1}{8}$ in. long, $\frac{1}{12}$ in. broad, odor agreeably aromatic, taste aromatic, sweet. Mericarps remain united and attached to the pedicel; each mericarp exhibits *many vittæ.*

Composition.—The chief constituent is the official *volatile oil* (*q. v.*)

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Identification.—It resembles *Dill*, *Caraway*, *Fennel* and *Conium* from which it can be distinguished by general characters.

OFFICIAL PREPARATION.

1. **Aqua Anisi.**—1 in 10. *Dose.*—½ to 2 ozs.

OLEUM ANISI. Oil of Anise.

Source.—Obtained by distilling anise fruit, or star-anise fruit, *Illicium verum* (N.O. *Magnoliaceæ*).

Characters.—Colorless or pale yellow, odor of the fruit, taste mildly aromatic. Sp. gr. 0·975 to 0·990.

Composition.—(1) *Anethol.* (2) *Anisic aldehyde.* (3) *Methyl-chavicol.*

Action.—Antispasmodic, carminative. **B.P. Dose.**—½ to 3 ms.

Enters into.—Tr. Camph. Co., Tr. Opii Ammon. and the

OFFICIAL PREPARATION.

1. **Spiritus Anisi.**—1 in 10. **B.P. Dose.**—5 to 20 ms.

PHARMACOLOGY AND THERAPEUTICS.

The action and uses of anise are almost identical with those of dill, except that it has a slight **expectorant** property and is often prescribed as a vehicle for cough mixtures.

ANTHEMIDIS FLORES.

Chamomile Flowers. N.O. *Compositeæ.*

Syn. I. V.—*Babuná-ful*, Hind.

Habitat.—Throughout Europe and some parts of India.

Source.—The dried expanded flower-heads of *Anthemis nobilis*, collected from cultivated plants.

Characters.—About ½ to ¾ in. in diameter, hemispherical white or nearly white. Involucre, composed of several rows of oblong bracts with membranous margins. Receptacle solid, covered with bracts. Florets ligulate, white; odor aromatic; taste bitter.

Composition.—(1) *Volatile* oil, official (*q.v.*). (2) *Extractives.*

Action.—Aromatic, stimulant and bitter tonic.

OFFICIAL PREPARATION.

1. **Extractum Anthemidis.**—Contains 15 ms. of oil of chamomile for every 1 lb. **B.P. Dose.**—2 to 8 grs.

OLEUM ANTHEMIDIS. Oil of Chamomile.

Source.—The oil distilled from chamomile flowers.

Characters.—Pale-blue or greenish-blue, becoming yellowish-brown. Odor and taste of the flowers. Sp. gr. 0·905 to 0·915.

Composition.—(1) *A terpene.* (2) *Angelic and tiglic esters* of isobutyl, amyl and hexyl alcohols. (3) *A bitter principle.*

Enters into.—Ext. Anthemid. **B.P. Dose.**—½ to 3 ms.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Action and Therapeutics.

Externally.—A warm infusion, decoction or poultice is a domestic remedy for **sprains** and **inflammations** in their early stages.

Internally.—The flowers are **aromatic, bitter** and **stomachic** and may be given in **atonic dyspepsia.** A large draught of warm infusion acts as an **emetic,** and may be given in **ague** and **biliousness.** The oil is often combined with purgatives to correct their griping properties. The tincture of the German chamomile is praised by Dr. Ringer in summer diarrhœa of children.

ANTIMONIUM NIGRUM PURIFICATUM.

Antimonious Sulphide. Sb_2S_3.

Source.—The native antimonious sulphide purified.

Antimonious tersulphide is found in the Hymalayan mountains and is known as *Surmá* in India.

Characters.—A greyish-black crystalline powder. *Impurities.*—Arsenic and other sulphides.

Enters into.—The preparation of Antim. Sulph.

ANTIMONII OXIDUM.

Antimonious Oxide. Sb_4O_6.

Source.—Prepared by pouring solution of antimonious chloride into water, $SbCl_3 + H_2O = SbOCl + 2HCl$, and decomposing the precipitate antimony oxychloride with sodium carbonate, $2SbOCl + Na_2CO_3 = Sb_2O_3 + 2NaCl + CO_2$.

Characters.—A greyish-white powder. *Solubility.*—Readily in HCl, insoluble in water, alcohol and HNO_3. *Impurities.*—Higher oxides.

Action.—Diaphoretic, emetic. **B.P. Dose.**—1 to 2 grs.; $\frac{1}{6}$ to $\frac{1}{4}$ grs. for a child 1 year old.

Enters into.—The preparation of Antimonium Tart. and the

Official Preparation.

1. **Pulvis Antimonialis.**—A substitute for *James' Powder.*—1 in 3. **B.P. Dose.**—3 to 6 grs.; $\frac{1}{4}$ to $\frac{1}{2}$ gr. for a child 1 year old.

ANTIMONIUM SULPHURATUM.

Sulphurated Antimony.

Source.—A mixture containing antimony sulphides and oxides, Sb_2S_5, Sb_2O_5, Sb_2S_3, Sb_4O_6 and sulphur, prepared by boiling antimonious sulphide with sublimed sulphur and solution of caustic soda and adding diluted sulphuric acid and water.

Characters.—A dull-red powder. *Solubility.*—Insoluble in water.

Action.—Diaphoretic, alterative, emetic. **B.P. Dose.**—1 to 2 grs.

Enters into.—Pil. Hydrag. Subchlorid. Co.

CC-0. Vasantha Madhava Collection. Digitized by eGangotri

ANTIMONIUM TARTARATUM.

Tartarated Antimony. $[K(SbO)C_4H_4O_6]_2H_2O$.

Syn. B.P.—Potassio-tartrate of Antimony. Tartar Emetic.

Source.—Prepared by setting aside a mixture of antimonious oxide and acid potassium tartrate, made into a paste with a little water, until combination has taken place, and then purifying by crystallisation from water.

Characters.—Colorless, transparent crystals with triangular facets. Taste sweet, metallic. *Solubility.*—1 in 17 of cold, 1 in 3 of boiling water. The solution is acid. *Impurity.*—Acid tartrate of potassium.

Incompatibles.—Alkalis, lead salts, gallic and tannic acids and most astringent substances.

Action.—Diaphoretic, expectorant, cardiac sedative, emetic.

B.P. Dose.—Diaphoretic, $\frac{1}{12}$ to $\frac{1}{6}$ gr.; expectorant, $\frac{1}{8}$ to $\frac{1}{4}$ gr.; emetic, 1 to 2 grs.; given in solution or powder. (*Carefully note the doses.*)

Official Preparation.

1. **Vinum Antimoniale.**—2 grs. to 1 oz.

B.P. Dose.—10 to 30 ms.; 2 to 4 drs. as an emetic. For a child 1 year old 3 ms. as an expectorant, and 15 ms. as an emetic.

Pharmacology.

Externally.—Salts of antimony cause a characteristic local inflammation, at first papular, then vesicular and lastly pustular, simulating small-pox. This is due to the formation of insoluble irritant precipitates at the orifices of sweat-glands by the acid solution (perspiration). Hence they are **irritants** and **pustulants.**

Internally. **Gastro-intestinal tract.**—The local effects of antimony on the mouth, fauces, œsophagus and stomach are the same as on the skin if it is taken in toxic doses or continued long medicinally. In small doses, it produces a sense of warmth and soreness in the stomach, and in larger doses loss of appetite, nausea and increased secretion of gastro-intestinal mucus. In still larger doses, 2 to 3 grs., it **induces vomiting,** due to (1) the direct stimulation of the gastric nerves reflexly exciting the vomiting centre, and (2) the stimulation of the vomiting centre through the medium of blood, which becomes evident if the drug is injected into the circulation and the stomach is replaced by a bladder. A portion of the drug is **excreted** by the gastro-intestinal mucous membrane, and causes vomiting again by its remote local effect. If given largely diluted with water it causes less vomiting but more purging. In toxic doses it induces **gastro-enteritis,** with symptoms resembling those of cholera.

Heart and circulation.—Soluble antimonial salts enter the blood readily, but do not appear to combine with the albumen of the plasma. From the beginning, even in small doses, antimony reduces the **force and frequency of the cardiac beat,** which tends to become intermittent, and in large doses the heart becomes

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

profoundly depressed with acceleration of the pulse-rate. The **blood pressure falls** considerably (1) partly from the depressed condition of the heart, (2) partly from the relaxed state of the arterioles caused by the depression of some portion of the vaso-motor system, and (3) partly reflexly from the stomach (nausea). Hence, antimony is a **powerful cardiac and circulatory depressant.** (Compare its action with that of aconite on the heart, p. 203.).

Lungs and respiration—Respiration is very much **depressed** after a brief stimulation. Inspiration becomes short, expiration prolonged, and finally respiratory movements irregular. Antimony is eliminated by the bronchial mucous membrane, and acts as an **antiphlogistic expectorant.**

Temperature is not much affected in health, but is **reduced in fevers,** owing chiefly to (1) the depressed condition of the circulation, (2) diaphoresis, and (3) to some extent, diminished metabolism.

Liver.—Tartar emetic particularly antimonium sulphuratum directly increases the **secretion of bile,** and is therefore a direct **cholagogue.** It tends also to increase the formation of urea and carbonic acid, and depress the glycogenic function. If continued long, it causes **fatty degeneration.** In these respects its action resembles those of arsenic and phosphorus (*q.v.*).

Skin.—It is a **powerful diaphoretic,** due chiefly to (*a*) the depressed condition of the circulation, and possibly to some extent, (*b*) the remote local effect on the sweat-glands. Like arsenic it affects the skin of frogs, making the cuticle a soft jelly-like mass which can be scraped off easily. (See p. 175).

Kidneys.—Tartar emetic in passing through the kidneys may produce a slight **diuretic** effect, depending very much on the action of the skin.

Nervous system.—Tartar emetic is a **powerful sedative** to the nervous system, especially the sensory and motor tracts of the cord, which are affected directly and not through the blood. The cerebrum is also depressed though not so profoundly, causing a feeling of languor, inaptitude for mental exertion, lowness of spirits and sleepiness.

Muscular system.—Both the voluntary and involuntary muscles, especially the former, are **profoundly depressed** and **relaxed,** chiefly by nauseating doses. It is therefore a muscular **antispasmodic.**

Metabolism.—Its effects on metabolism are pretty much the same as those of phosphorus and arsenic (which see). In minute doses it has a slight **alterative** action, but in continued doses, it clings to the tissues tenaciously for some months, producing (*a*) a fatty degeneration of the organs, especially the liver. (*b*) an increased formation of nitrogenous products, and (*c*) a deficient oxidation in the tissues. According to Ringer, antimony

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

is a protoplasmic poison and paralyses the functions of nitrogenous tissues like arsenic, aconite and hydrocyanic acid.

Elimination.—Antimonial salts are excreted by the kidneys, liver, skin, mucous membranes of the bronchi and gastro-intestinal tract and mammary glands. A portion is retained in the body.

Toleration.—Large doses given several times a day sometimes do not induce vomiting, thereby producing tolerance of the drug. This is probably due to the arrest of the acid secretion from its irritant effects (Brunton).

Acute toxic action is very much the same as that of arsenic (see p. 175). The *post-mortem* appearances are not so marked as in arsenical poisoning.

Antidotes—Emetics or stomach-pump if vomiting is not free. *Tannin is the chief antidote* in any shape. Strong tea, coffee, gallic acid, astringent infusions, and demulcent drinks should be freely given. Stimulants, strychnine and digitalin subcutaneously are also necessary. *Chronic toxic action* is rare now-a-days For butter of antimony the antidotes are the same as those for mineral acids (see p. 191).

The action of tartar emetic resembles in many respects that of aconite, and the student will no doubt find assistance by studying following table :—

	Tartar emetic.	Aconite.
1.	An irritant and pustulant to the skin and mucous membrane.	A sensory depressant and anæsthetic to the same.
2.	An emetic, and purgative in large doses.	A gastro-intestinal irritant in toxic doses.
3.	A powerful cardiac, circulatory and respiratory depressant.	The same.
4.	Lowers blood-pressure.	The same.
5.	An antiphlogistic expectorant	*Nil.*
6.	A powerful depressant to the cord, and to a less extent to the brain. A muscular relaxant.	A powerful depressant to the sensory nerve-endings. Only large doses cause muscular weakness.
7.	A powerful diaphoretic.	Not so powerful as a diaphoretic.
8.	An antipyretic.	The same.
9.	A cholagogue, especially antimonium sulphuratum.	*Nil.*
10.	Causes fatty degeneration and is deposited in the tissues.	*Nil.*

THERAPEUTICS.

Externally.—As a *counter-irritant*, tartarated antimony ointment is not used now, though in former days it was largely employed in diseases of the lungs, meninges and joints.

Internally. **Gastro-intestinal tract.**—As an *emetic*, tartar emetic is not suitable in cases of **poisoning** on account of its tardy action and the general prostration it induces, but is of great service in those cases of acute inflammatory affections of the res-

Digitized by Google

piratory tract, such as **croup** and **bronchitis**, where both emesis and vascular depression are needed. **Intermittent fevers**, rebellious to quinine, yield when it is given after an antimonial emetic.

Circulation and respiration.—As an *antiphlogistic*, tartarated antimony in $\frac{1}{60}$ gr. doses may be given like aconite in a variety of acute inflammatory diseases at the outset, such as **tonsillitis, laryngitis, acute bronchitis, pneumonia, pleurisy, pericarditis, peritonitis, ovaritis**, &c. In **acute bronchial affections** of children, antimony still holds a high place when given alone or in combination with ipecacuanha. Half to one tea-spoonful of wine as an emetic, followed by 3 to 5 drops every one or two hours, keeps up expectoration and wards off bronchial spasms.

Fevers.—Tartarated antimony at once cuts short an attack of **catarrhal fever**. As a *diaphoretic* it may sometimes be given to reduce the pyrexia in sthenic subjects. Pulv. Antimonialis Co. is a mild diaphoretic, and may yet occasionally be prescribed in **catarrhal fever and broncho-pneumonia** with good results. To check delirium Graves recommends the use of tartar emetic with opium.

Nervous and muscular systems.—Tartarated antimony may be used also to allay the excitement in **mania** and to induce sleep in **acute alcoholism**. Before the introduction of general anæsthetics, it was largely employed as a **relaxant of muscles, in dislocations** and **hernia**. Even now, it is occasionally given to relax the **rigidity** of the os during parturition.

As an *alterative and cholagogue*, antimonium sulphuratum is often given in **gout** and **hepatic fulness**. With calomel (Plummer's pill) it is given in **syphilis**.

Prescribing hints.—Tartarated antimony is seldom used now. Being a soluble and tasteless salt it is best given in solution. It should be commenced in very small doses, $\frac{1}{60}$ to $\frac{1}{40}$ gr., for it has been found that $\frac{1}{40}$ gr. taken repeatedly causes vomiting. It should never be given as a purgative, and in order to prevent this action it is often combined with opium. Its action on the bronchial mucous membrane is greatly augmented if it is combined with iodides or ipecacuanha.

APOCYNUM CANNABINUM. U.S.

(Non-official).

Syn.—Canadian Hemp.

Composition.—The root contains a resin, Apocynin, and a glucoside, Apocynien.

Dose.—1 to 20 grs. of powdered root.

Action.—Emetic, Cathartic, Diaphoretic and Diuretic.

Non-Official Preparation.

1. **Tinctura Apocyni.** (1 in 10). *Dose.*—5 to 60 ms.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

In large doses it is a powerful emetic and diaphoretic. It is also a cathartic and diuretic and is therefore useful in **dropsy** and **Bright's disease.**

It exerts a powerful slowing action on the heart but resembles strophanthus more than digitalis. Uræmia may often be warded off by profuse diuresis produced by this drug: it is also useful in causing the absorption of pleuritic effusions. For these reasons it is commonly known in America as "the Vegetable Trocar." Is very little used in Europe, but is much esteemed in India.

APOMORPHINÆ HYDROCHLORIDUM. See Opium.

AQUA DESTILLATA.

Distilled Water. H_2O.

Source.—Prepared by distillation from good potable water.

Characters.—Colorless, tasteless, odorless. Should be free from metals, chlorides, nitrates, nitrites or sulphates.

Used in pharmacy and making up prescriptions.

Pharmacology of Water.

Externally.—The actions of water in different forms and of different temperatures have been fully described under the heads of Baths, Fomentations, Poultices, &c. (see p.p. 62—5, 67, and 69—70).

Boiled or sterilised water is almost free from micro-organisms and is therefore an **antiseptic.** Hot water is also a local **hæmostatic.**

Internally. **Alimentary canal.**—Water is an essential article of food. It allays thirst reflexly as well as by diluting the plasma after absorption. When drunk in moderation and at definite hours, it increases the secretion of saliva, bile, and gastro-intestinal and pancreatic juices Large quantities derange digestion and cause diarrhœa. Warm water acts as an **emetic** and hot water a **gastric sedative.**

Blood and circulation.—Water is quickly absorbed into the blood. A sudden influx of water into the circulation, if the body has suffered a great loss of the same, may cause death from rapid destruction of corpuscles by osmosis.

Kidneys.—Copious drinking flushes the kidneys and bladder and carries with it effete products circulating in the blood, such as excess of urea, phosphoric and sulphuric acids and sodium chloride, but lessens the amount of uric acid. Thus water is a natural **diuretic.**

Skin.—In hot weather, a glass of water is sufficient to bring on perspiration with many persons, but in cold weather drinks do

Digitized by the Internet Archive in 2010 with funding from University of Toronto

this with the aid of external warmth. Water is therefore a powerful **diaphoretic.**

Metabolism.—Water plays an important part in tissue metamorphosis. Taken under certain precautions, it facilitates construction and destruction of tissues, and thus acts as a true **metabolic stimulant.** Hence is the improvement of patients under the water-treatment.

THERAPEUTICS OF WATER.

Externally.—Besides its uses already adverted to in pages 62—5, 67, 69, water, in the form of ice, or constantly changed through a Leiter's coil, is useful in subduing many acute inflammatory diseases, such as **meningitis, cerebritis, synovitis, sprains,** &c. It contracts not only the superficial blood-vessels, but also those of the organs by reflex action. On the same principle, a local application of ice to the surface, arrests internal hæmorrhages, such as **epistaxis, hæmoptysis, hæmatemesis,** &c. A sudden partial application of cold to the abdomen, by flapping a wet towel over it, excites contraction of the parturient womb, and is therefore employed in **uterine inertia** and **post-partum hæmorrhage.** A smart sprinkling of cold water on the face restores consciousness in **hysteria, fainting** and **narcotic** and **chloroform poisoning.** The same plan may be adopted in reviving still born infants. Iced water subcutaneously injected over the diaphragm checks **hiccough,** and within paralysed muscles improves their nutrition. Hot water injected into the womb arrests **post-partum hæmorrhage.**

Internally.—The sucking of ice allays thirst, vomiting and hiccough. A small glass of cold water slowly sipped controls the craving for **drinks** by stimulating the circulation. In the same manner, hot water before meals soothes the irritable conditions of the stomach in **gastritis, gastrodynia** and **gastric ulcers.** A glass of cold water taken immediately on rising from bed helps the bowels to act. The swallowing of ice arrests **hæmatemesis.** Copious draughts of water help to wash out minute deposits of **urinary gravel.** If it is a uric acid calculus, drinking of distilled water diminishes the tendency to deposition. Large draughts of water given between meals may arrest the formation of **gallstones** by liquefying the bile. As an *emetic,* warm water should not be given in quantities sufficient to over-distend the stomach, as this may paralyse its muscular fibres and thereby impede rather than promote vomiting. Half to one pint at a time is enough for the purpose.

ARACHIS OLEUM. Arachis Oil.

N. O. *Leguminosæ.* (*Ind. and Col. Addendum.*)

Syn. B. P.—Earth-nut oil, Ground-nut oil.

Syn. I. V.—*Chiná-badámer tel, Mátkaldier tel,* Beng. *Mungphali ke tel,* Hind.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Habitat.—India, Africa and Eastern Colonies.

Source.—Expressed without heat from the seeds of *Arachis hypogæa.*

Characters.—Pale yellow or geenish-yellow, ordor faint nut-like, taste bland, nutty. Sp. gr. 0·916 to 0·918. Becomes rancid and thick slowly.

Composition.—(1) *Oleic.* (2) *Hypogæic.* (3) *Palmilic.* (4) *Arachic acids.*

Pharmacology and Therapeutics.

Externally.—The oil makes a good substitute for olive and almond oils, and has long been used in Indian pharmacy in their stead, though not with the sanction of the B. P.

Internally.—It has a gentle **aperient** action. The seeds are very nutritive, as they contain 31·9 p. c. of nitrogenous compounds, 37·8 p. c. of starch and sugar and 11·8 p. c. of fatty matter. They are largely eaten in India, Africa and America.

ARAROBA. Araroba.

N.O. *Leguminosæ.*

Syn. B. P.—Goa Powder, Crude Chrysarobin.

Habitat.—Brazil (Bahia).

Source.—Found in cavities in the trunk of *Andira araroba*, freed as much as possible from fragments of wood, dried and powdered.

Characters.—Brownish yellow to amber-brown powder, yielding to hot chloroform not less than 50 p.c. of chrysarobin.

Enters into.—The preparation of Chrysarobin (*q v.*)

CHRYSAROBINUM. Chrysarobin.

Source.—Obtained from araroba by extracting with hot chloroform, evaporating to dryness and powdering.

Characters.—Crystalline, yellow, tasteless, inodorous powder. *Solubility.*—Entirely in hot chloroform, almost entirely in alcohol (90 p.c.), partially in petroleum spirit, slightly in water.

Composition.—(1) *Chrysarobin*, Syn.—*Rhein, Chrysophan.* (2) *Chrysophanic Acid.*

Official Preparation.

1. **Unguentum Chrysarobini.**—1 in 25.

Non-Official Preparations.

1. **Pigmentum Chrysarobin.**—Chrysarobin 1 dr., Chloroform 10 drs., Gutta-percha, (pure) 1 dr. Dissolve. Does not stain cloth.

2. **Ung. Acid. Chrysophanici.** (Malcolm Morris).—Acid. Chrysophanic, 20 grs. Ol. Deelinæ 2 drs. Lanolin to 1 oz. Mix.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY.

Externally.—Chrysarobin is a powerful **irritant** to the skin producing a sort of erythematous inflammation. It does not irritate so much the diseased parts as the healthy skin. It destroys low vegetable growths infesting the surface of the body, and is therefore a powerful **parasiticide**. It is absorbed from the skin.

Internally.—Even in small doses, say $\frac{1}{8}$ gr., it powerfully irritates the gastro-intestinal mucous membrane, causing anorexia, vomiting and purging with gripes. It is therefore a powerful **gastro-intestinal irritant.**

It is eliminated chiefly by the kidneys and partly by the skin. The urine is stained purple.

THERAPEUTICS.

Externally.—As a *parasiticide*, it is a capital remedy for **ringworm** and other forms of **tinea.** The B.P. ointment not being strong enough, requires its strength to be increased occasionally. It is also useful in many chronic dry skin diseases, such as **psoriasis, eczema, acne rosacea.** An ointment ($\frac{1}{2}$ to 1 dr. in 1 oz. of heated vaseline) rubbed into the parts night and morning, acts like a charm in **chronic psoriasis.**

Internally.—It should not be prescribed internally on account of its irritating properties, though success has sometimes attended its internal administration in **psoriasis, eczema, acne,** &c.

Prescribing hints.—Chrysarobin should not be applied to the face, though a mild ointment (15 grs. to 1 oz.) may not produce much irritation if applied to the scalp. To prevent the irritation of the surrounding healthy skin, its application should *be exclusively confined to diseased islands.* This may best be done by painting the parts with Pig. Chrysarobin. and covering the pigment with collodion, or by applying a stiff ointment covered over with a piece of isinglass or Mead's plaster. The stains on the linen may be removed by a weak solution of potash or chlorinated lime, and partially by vegetable acids. Chrysarobin should never be applied to a large surface of the body at one time, otherwise it may produce most unpleasant symptoms. In cases of extensive ringworm, treat the disease bit by bit, curing one patch before you attack another.

ARGENTI NITRAS.

Silver Nitrate. $Ag\,No_3$.

Syn. B. P.—Lunar Caustic.

Source.—Prepared by the interaction of nitric acid and silver, $3Ag_2+8HNO_3=2NO+6AgNO_3+4H_2O$.

Characters.—Colorless, tabular, rhombic crystals. *Solubility.*—2 in 1 of water. *Impurities.*—Other nitrates.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Incompatibles.—Alkalis and their carbonates, bromides, chlorides, phosphates, iodides, acids (except nitric and acetic), alkaloids, and solutions of arsenic and tannin.

Dispensing hints.—It should be stocked aud dispensed in amber-colored or uranium bottles (see p. 75), and its pill massed with kaolin, and paraffin ointment. (See p. 88.)

Action.—Caustic, astringent, antiseptic and nervine tonic. **B.P. Dose.**—¼ to ½ gr. *Daily Dose.*—3 grs. in pill.

OFFICIAL PREPARATIONS.

1. **Argenti Nitras Induratus.** *Syn.*—*Toughened Caustic.*—Greenish-white cylindrical rods or cones obtained by fusing silver nitrate 475 grs. and potassium nitrate 25 grs. in a platinum capsule, and pouring into moulds.

2. **Argenti Nitras Mitigatus.** *Syn.*—*Mitigated Caustic.*—Greyish-white rods or cones obtained by fusing silver nitrate 1 oz. and potassium nitrate 2 ozs. as above.

ARGENTI OXIDUM.

Silver Oxide. Ag_2O.

Source.—Prepared by mixing solutions of Silver Nitrate and calcium hydroxides, $2AgNO_3 + Ca(OH)_2 = Ag_2O + Ca(NO_3)_2 + H_2O$.

Characters.—A brown powder which at a low red heat gives oxygen and yields metallic silver.

Incompatibles.—Chlorides, organic substances, creosote, phenol, potassium permanganate (see p. 109).

Action.—Tonic, antispasmodic. **B.P. Dose.**—½ to 1 gr. in pill.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES OF SILVER.

1. **Pigmentum Argenti Nitras Æthereum. L.H.**—Silver Nitrate 20 grs., Distilled Water 1 dr., Spt. Æther Nitrosi to 1 oz. As a paint on greasy skin.

2. **Argentamin.**—A solution of silver phosphate in ethylene-diamine solution. Antiseptic and astringent. As an injection (1 in 2,000 to 4,000) in gonorrhœa.

3. **Itrol.** *Syn.*—*Argenti Citras.*—A non-caustic powder soluble 1 in 4,000 of water. Antiseptic, astringent.

4. **Actol.** *Syn.*—*Argenti Lactas.*—In powder or crystals soluble in water. Antiseptic, astringent.

5. **Argentol.**—A compound of silver with oxychinoline. A sparingly soluble yellowish powder acting like iodoform. As an injection (1 in 1,000) in gonorrhœa.

6. **Argentum Colloidale** (Crede's). *Syn.*—*Collargol.*—Metallic silver in a colloid state. Its ointment (Agr. Coll. ½ oz., Aqua Dist. 1 ½ drs., Cera Alba. 2½ drs., Adep. Benz. 2 ozs. 2½ drs.) is rubbed in septic and inflammatory diseases with doubtful results.

7. **Argonin.**—A silver-casein compound soluble in hot water. Antiseptic, parasiticide. A 10 p.c. solution injected in gonorrhœa.

8. **Largin.**—A silver-albumen compound. A powerful germicide. 1 to 6 grs. in water 1 oz. for injection in gonorrhœa.

CC-0. Mumukshu Bhawan Varanasi Collection. Digitized by eGangotri

9. **Argenti Iodidi.**—An alterative in gastralgia and syphilis. *Dose.*—¼ to 1 gr. in pill.

10. **Protargol.**—A silver-protein compound. A powerful germicide. A ¼ to 1 p.c. solution makes a painless injection in gonorrhœa. A solution (⅛ to 1¼ in 1½ ozs. of water) has been successfully used as a prophylactic against gonorrhœal infection, and internally in continued acute catarrhal diarrhœa.

11. **Albargin.**—A similar compound. Contains 15 p.c. of silver. A 0·2 p.c. solution useful as an injection in gonorrhœa.

12. **Argenti Acetas.**—White crystals, freely soluble in water. A 1 p.c. solution suggested for purulent ophthalmia of infants, as being less irritant.

13. **Argenti Fluoridum.** *Syn.*—*Tachiol.*—A powerful non-toxic bactericide.

14. **Argyrol.** *Syn.*—*Vitellin.*—A combination of a silver salt with a proteid obtained from wheat, contains 30 p.c. of metallic silver; very soluble in water, but not in alcohol. An excellent non-irritating application for mucous membranes. Solutions should vary from 2 to 5 p.c. according to the nature of the case. For cystitis use 1 in 5000 solution. As a mild caustic 1 in 100.

Pharmacology of Silver Salts.

Externally.—Soluble silver salts unite chemically with the albumen of the tissues and discharges to form abuminates, but their action does not penetrate into the deeper tissues. Applied to the unbroken skin in the form of a stick or concentrated solution silver nitrate produces at first a white stain which soon becomes blackened by exposure to light. This stain peels off as a dry black scale if the application is very light, or as a black slough if the application is prolonged. Hence it is a **caustic.** On a raw surface a solution of silver nitrate acts as an **excitant** and is (1) decomposed by the albumen of the plasma and discharges, and is precipitated as an albuminate which coats its surface, (2) contracts the blood-vessels and capillaries, and (3) coagulates the blood both within and without them. It is therefore a local **astringent, hæmostatic** and **antiphlogistic.** All silver salts are powerful **antiseptics.**

Internally. **Mouth.**—Silver nitrate is decomposed by the albumen and chlorides of the saliva, and imparts an astringent taste. In a concentrated form it acts in the same way as on the skin. If administration is prolonged, it produces a dark bluish discoloration at the edges of the gums and on the inside of the cheeks.

Stomach and intestine.—The undecomposed portion reaching the stomach is again acted upon by the hydrochloric acid and mucus, forming a double chloride of silver and sodium. In moderate doses it acts as an **astringent,** though this is doubted by some authorities, and in large doses as a **gatro-intestinal irritant.** Peptones dissolve the nitrate readily, and the solution does not precipitate albumen.

CC-0. Mumukshu Bhawan Varanasi Collection. Digitized by eGangotri

Blood.—Silver enters (we know not in what form) the blood. If it is not soon excreted or deposited in the organs, it collects in the red blood corpuscles and converts the hæmoglobin into hæmatin. Opinions differ as to its action as a **remote astringent.**

Nervous system.—Many believe that silver in minute doses acts as a **nervine tonic** like copper or zinc In toxic doses it is a **convulsant,** the convulsions being like those in strychnine poisoning. According to Gowers, it blunts the polarity of the nerve-centres, so that they are less easily influenced by external stimuli.

Skin.—If administered continuously, silver causes a leaden discoloration of the skin, due to the deposition of the reduced metal (?) in all the tissues of the skin except the rete Malpighi. Once deposited, it causes permanent disfigurement.

Elimination.—Silver salts are excreted with the fæces as a sulphide, staining them dark-brown, and by the intestinal secretion and bile. A portion is deposited in the organs, particularly the kidneys and liver.

Acute toxic action.—Severe vomiting, general prostration and nervous symptoms, particularly convulsions are the chief symptoms.

Chronic toxic action.—If silver is given internally for a long time, it causes impairment of digestion and nutrition, albuminuria, irregular cardiac action, paralysis as in lead poisoning, fatty degeneration and discoloration of the skin and other organs (*argyria*).

Antidotes.—In *acute poisoning* from accidental causes, mucilaginous drinks, such as thick gruel, should be immediately given to envelope the caustic, this should be followed by an emetic or stomach syphon. Common salt is the *chemical antidote.* White of egg, milk and water and other demulcents may be given freely.

THERAPEUTICS OF SILVER SALTS.

Externally. **Skin.**—The solid silver nitrate or mitigated caustic is of little value for destroying small **warts** or **excrescences.** It may be applied to **exuberant granulations, callous, indolent** or **lupoid ulcers, fistulæ, chancres,** &c, because of its limited caustic and after-stimulating effects on them. It is a valuable caustic for **post mortem wounds,** but not a reliable one for **bites** by poisonous snakes and rabid animals, as its action does not penetrate into the deeper layers. It arrests **bleeding** from **leech-bites.** Its solution may arrest the **pitting of small-pox** if painted on the vesicles with or without previous puncture. It is a capital remedy (1 to 2 drs. in 1 oz.) for arresting the progress of **erysipelas** and threatening **boils.** A milder solution (5 to 20 grs. in 1 oz.) disperses threatening **bedsores, herpes** and **eczema** if painted over the erythematous patches. It allays the itching of **pruritus.** A solution of silver nitrate turns gray hair **bluish-black.** To effect this, the hair is first washed

CC-0. Mumukshu Bhawan Varanasi Collection. Digitized by eGangotri

with silver nitrate solution (1 in 12), and then a comb or brush dipped in a solution of potassium sulphurat. (1 in 8) is applied.

Eyes and nose.—A solution of silver nitrate (5 to 10 grs. in 1 oz.) cures **granular conjunctivitis** and **opthalmia neonatorum.** The conjunctiva must first be rendered anæsthetic by means of cocaine. The silver solution is then applied with a camel's hair brush, and the excess of caustic afterwards neutralised by irrigation with Normal Saline Solution. A weaker solution (1 to 4 grs. in 1 oz.) may be used as a collyrium in **purulent conjunctivitis.** A weak solution makes a valuable irrigation in **rhinitis.**

Ear.—Brushing the meatus with a strong solution of silver, avoiding the membrana tympani, often relieves intolerable **pruritus** of the meatus.

Genitals.—Solid caustic is still used for cauterising **granular** or **ulcerated os** and **cervix.** A strong solution may be injected into or painted within the womb in **endometritis** or **endocervitis.** A weaker solution (1 to 2 grs. in 1 oz.) makes an effective injection in **gonorrhœa, leucorrhœa,** and **pruritus pudendi** due to leucorrhœa. Irrigation (1 in 1,00 to 10,000) has been successfully used in many cases of gonorrhœa. Many advocate injections of largin, itrol and protargol in gonorrhœa. (see p. 249).

Internally. **Alimentary Canal.**—Unhealthy or chronic **ulcers** in the mouth quickly heal after being touched with mitigated caustic. A solution (10 to 20 grs. in 1 oz.) is an excellent application for **sore-throat,** acute or chronic, **pharyngitis, follicular tonsillitis,** and **tubercular** and other **ulcerations** of the **larynx.**

Chronic diarrhœa rebellious to other drugs sometimes yields to silver nitrate. As an enema (1 dr. in 3 pints), it has been successfully employed in **chronic dysentery** and **ulcerations** of the **bowels.**

Nervous system.—As a tonic it was formerly much esteemed in many nervous diseases, such as **locomotor ataxy, hemiplegia** and **epilepsy,** but the unpleasant symptoms of **argyria** are the chief barrier to its use and on that account, Nitrate of Silver is now very rarely used by neurologists.

Silver oxide is less irritating and has sometimes been found very useful in **gastrodynia,** and as a remote hæmostatic in **menorrhagia.**

Caution.—To avoid **argyria,** the use of the drug must be suspended as soon as a dark line is noticed on the edges of the gums, which may be removed by a course of acid tartrate of potassium. Its administration must be stopped for two weeks after two months' use, however small the dose may be. 100 grains should be the maximum dose per month.

Prescribing hints.—Silver salts are given in pills (see p. 88)

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

after food, but if their local action on the stomach is desired, they should be given on an empty stomach preferably in solution. For application to the skin, a solution of the nitrate in nitrous ether is the best, as it does not run in drops, and it is a stronger preparation than the aqueous solution.

ARISTOLOCHIA. Aristolochia.

N. O. *Aristolochiaceæ.*

(*Ind. and Col. Addendum.*)

Syn.—The Indian Birthwort. **Syn. I.V.**—*Isarmul*, Beng. Hind.

Habitat.—India, Eastern Colonies.

Source.—The dried stem and root of *Aristolochia Indica.*

Characters.—*Stem.*—In cylindrical pieces ⅝ in. in diameter, greyish-yellow, marked with scars and furrows. *Root.*—Dark-brown, transversely constricted, bark separable from wood. Odor spicy, camphoraceous. Taste bitter.

Official Preparations.

1. **Liq. Aristolochiæ Conc.**—Aristolochia 10 ozs., Alcohol (20 p.c.) 25 ozs. or *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 2 drs.
2. **Tinctura Aristolochiæ.**—Powdered Aristolochia 4 ozs., Alcohol (70 p.c.) *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

Externally.—The expressed juice of the root and leaves is considered by the natives of India an antidote to snake-bites when applied to the bitten part.

Internally.—The drug is a mild **bitter tonic** and is said to be useful in intermittent fever and other affections. It does not possess any other properties and is therefore not fit to be retained in the B P.

ARMORACIÆ RADIX. Horseradish Root.

N.O. *Cruciferæ.*

Habitat.—Britain, Europe, North America.

Source.—The fresh root of *Cochleria armoracia* collected from cultivated plants.

Characters.—Nearly cylindrical except at the crown where it is enlarged, marked with semi-amplexicaul leaf-scars.

Idenification.—It is strange that this root has been mistaken for Aconite root. Their differential characters are tabulated below :—

Horseradish Root.	Aconite Root.
Size.—Larger, 1½ in. in diameter, 1 ft. long, nearly cylindrical.	*Size.*—Smaller, ½ to ¾ in. diameter, gradually tapering.
Color.—Pale-yellowish without, whitish and fleshy within.	*Color.*—Dark-brown without, whitish and starchy within.
Odor.—Pungent.	*Odor.*—*Nil.*
Taste.—Pungent.	*Taste.*—Persistently tingling.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Composition.—(1) A *volatile oil* allied to the volatile oil of the black mustard seeds. (2) Other constituents.

Action.—Sialagogue, stimulant, diuretic.

OFFICIAL PREPARATION.

1. **Spiritus Armoraciæ Compositus.**—1 in 8. **B.P. Dose.**—1 to 2 drs.

PHARMACOLOGY.

Externally.—It is a **rubefacient** like mustard, but is never used as such.

Internally.—It increases the salivary and gastric secretions, and after absorption stimulates the kidneys and sweat-glands during its excretion. It is therefore a **sialagogue, gastric stimulant, diuretic** and a feeble **diaphoretic.**

THERAPEUTICS.

Internally.—An infusion of equal parts of fresh root and black mustard seeds has been found to be an effective **gargle** for relaxed conditions of the throat. The root may be chewed in **toothache** and **paralysis** of the tongue and cheeks. It has been usefully employed in **atonic dyspepsia, chronic rheumatism** and **dropsy.** The compound spirit is a good flavouring carminative.

ARNICÆ RHIZOMA.

Arnica Rhizome. N.O. *Compositæ.*

Syn. B.P.—Arnicæ Radix.

Habitat.—Mountainous regions of Central and Southern Europe.

Source.—The dried rhizome and roots of *Arnica montana.*

Characters.—Cylindrical, dark brown, 1 to 2 in. long, $\frac{1}{6}$ to $\frac{1}{4}$ in. thick, curved, rough. Bears amplexicaul leaf-scars and wiry rootlets. Taste acrid, britter. Odor aromatic.

Identification.—It resembles *Serpentary* and *Valerian* distinguishable by their general characters and their characteristic odors, and *Veratum Veride* distinguishable by its thicker rootlets.

Composition.—(1). *Arnicin* the active principle. (2). *Volatile oil.* (3). *Inulin.* (4) A *resin.*

OFFICIAL PREPARATION.

1. **Tinctura Arnicæ.**—1 in 20.

ARNICÆ FLORES. Arnica Flowers.

(*Ind. and Col. Addendum*)

Source.—The flower-heads of *Arnica montana.*

Characters.—The flower-heads consist of a scaly involucre in two rows and a hairy receptacle, bearing 16 to 20 yellow three toothed, ten-nerved ray-florets, and numerous yellow five-toothed tubular disc-florets. Odor aromatic. Taste bitter.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparation.

1. **Tinctura Arnicæ Florum.**—Flowers 2 ozs., Alcohol (45 p.c.) *q.s.* By percolation to 1 pint. **B.P. Dose**—½ to 1 dr.

Pharmacology.

Externally.—Arnica **stimulates the cutaneous blood-vessels**, and when its evaporation is stopped, causes hyperæmia, eczema and spreading erythematous inflammation simulating erysipelas.

Internally.—Like volatile oils, it is a **warm aromatic** and **stimulant** to the alimentary canal, increasing gastric and intestinal peristalsis. In large doses it is a powerfull **gastro-intestinal irritant**. In small doses, it **reflexly excites** the vascular and nervous systems, and in large doses depresses them, producing partial insensibility, convulsions and syncope. It is a **remote stimulant** to the skin and kidneys.

Therapeutics.

Externally.—Arnica is chiefly used as a lotion (1 to 4 drs. in 1 pint) in **bruises** and **sprains**. According to Garrod the good effects, if any, are due to the spirit of the same strength rather than to the tincture.

Internally.—Many fancied therapeutical uses have been suggested, *e.g.*, in fever, delirium tremens, rheumatism, chronic bronchitis, dysentary with doubtful results The tincture of the flowers is considered more active than that of the root and is largely employed in the American Colonies.

ASAFETIDA. Asafetida.

N.O. *Umbelliferæ.*

Syn. I.V.—*Hing*, Beng. *Hingrá*, Hind., Bom.

Habitat.—Afghanistan, the Punjab, Persia and Turkistan.

Source.—A gum-resin obtained by incision from the root of *Ferula fœtida.*

The fine quality is known as *khândâhâri-hing.* The common one as *hingrâ.*

Characters.—In rounded or flattened, agglutinated, dull yellow tears, darkening on keeping. Internally yellowish, translucent, or milky-white, opaque. Odor strong, persistent, alliaceous. Taste bitter, acrid, alliaceous When triturated with water forms a white emulsion. Should contain not less than 65 p.c. of soluble matter in alcohol 90 p.c. *Impurities.*—Earthy matter, flour, gypsum, and pieces of roots.

Identification.—It resembles *Ammoniacum, Benzoin* and *Galbanum*, distinguishable by its strong characteristic alliaceous odor.

Composition.—(1) *Volatile oil*, 5 p.c. containing essential oil of garlic allyl persulphide which gives it its peculiar odor. (2). *Bassorin resin*, 65 p.c. (3). *Gum* 25 p.c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Action.—Stimulant, antispasmodic. **B.P. Dose.**—5 to 15 grs.
Enters into.—Pil. Galbani Co. and the

Official Preparations.

1. **Pilula Aloes et Asafetida.**—1 in 4. **B.P. Dose.**—4 to 8 grs.
2. **Spiritus Ammoniæ Fetidus.**—33 grs. of Asafetida in 1 oz. **B.P. Dose.**—20 to 40 ms. for repeated use, and 60 to 90 ms. for a single dose.
3. **Tinctura Asafetida.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

Pharmacology.

Externally.—Asafetida has a very feeble stimulating effect on the skin.

Internally. **Gastro-intestinal canal.**—Like aromatic oils and resins, it is a **stimulant, carminative** and **antispasmodic,** expelling flatus and relieving spasm; but its unpleasant nauseous taste is a drawback to its use. In large doses it causes vomiting and purging. It is absorbed by the mucous membrane.

Lungs.—Like onion it increases and disinfects the bronchial secretion during its elimination. Hence it is a **disinfectant expectorant.**

Nervous System.—It **reflexly stimulates the nervous system** through the mouth and stomach.

Elimination.—By the bronchial secretion and urine.

Therapeutics.

Externally.—A thick emulsion prepared by triturating with water is often applied with benefit by the writer to the abdomen of infants in **tympanites.**

Internally.—It is rarely used now except in **hysteria** and **tympanites.** In the latter disease it may be given as an **enema** (30 grs. rubbed with water 4 ozs.). Spt. Ammon. Fetid. is an excellent antispasmodic for **flatulent colic** of children or **hysterical flatulence** of young women. Cases of malingering may be cured sometimes by giving effervescing draughts containing a few minims of asafetida and valerian 3 or 4 times a day.

Prescribing hints.—It is best given in pills capsuled or varnished. If the tincture is prescribed, it should be suspended in mucilage.

ATROPINA. See Belladonnæ Folia.

AURANTII CORTEX RECENS.

Fresh Bitter Orange Peel. N. O. *Rutaceæ.*

Syn. I. V.—*Kamlá nembur khosá,* Beng. *Nárengi ke boklá,* Hind.
Habitat.—Southern Europe, India and Eastern Colonies.
Source.—The fresh outer part of the pericarp of *Citrus Aurantium, var. Bigaradia.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Externally orange-red, rough, glandular. Inner surface whitish spongy. Odor pleasant, aromatic. Taste bitter.

OFFICIAL PREPARATIONS.

1. **Syrupus Aromaticus.** *Syn.—Simple Elixir.*—**B.P. Dose.**—½ to 1 dr.
2. **Syrupus Aurantii.**—1 in 8. **B.P. Dose.**—½ to 1 dr.
3. **Tinctura Aurantii.**—1 in 4. **B.P. Dose.**—½ to 1 dr. *Enters into.*—Conf. Sulph., Syr. Aurant., Syr. Aromat., Syr. Cascar. Aromat, Tr. Quininæ, and Troch. Sulph.
4. **Vinum Aurantii.**—**B.P. Dose.**—½ to 2 ozs. *Enters into.*—Vin. Quininæ and Vin. Ferri Citratis.

AURANTII CORTEX SICCATUS.

Dried Bitter Orange Peel.

Source and Characters.—The dried outer pericarp of *Citrus Aurantium, var. Bigaradia*, in thin strips.

Composition.—(1) *A fixed oil*, 1 to 2 p. c., which consists of a terpene, dextro-rotatory limonene. (2) 3 *glucosides*—hesperidin, isohesperidin, and aurantiamarin.

Enters into.—Inf. Gentian. Co., Spt. Armoraciæ Co., Tr. Cinch. Co., Tr. Gentianæ Co. and the

OFFICIAL PREPARATIONS.

1. **Infusum Aurantii.**—1 in 20. **B.P. Dose.**—½ to 1 oz.
2. **Infusum Aurantii Compositum.**—1 in 40. **B. P. Dose.**—½ to 1 oz.

AURANTII FLORIS AQUA.

Orange-Flower Water.

Source and Characters.—A commercial, colorless or greenish-yellow, fragrant water obtained by distilling the flowers of the bitter orange tree.

To be diluted with twice its volume of distilled water before use.

OFFICIAL PREPARATION.

1. **Syrupus Aurantii Floris.**—1 in 6¾. **B.P. Dose.**—½ to 1 dr.

AURANTII CORTEX INDICUS.

Indian Orange Peel.

(Ind. and Col. Addendum.)

Source.—The fresh and the dried outer part of the pericarp of varieties of *Citrus Aurantium* grown in India and Ceylon.

In India and the Colonies this may be used for the same purposes as the fresh orange peel.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

Externally.—Orange-flower water may be used as a vehicle for lotions. Neroli oil is used for perfuming hair-oils and pomades.

Internally.—The bitter orange-peel is a feeble **bitter, stomachic** and **tonic**, and is generally used in combination with other bitters, such as gentian. The water is mainly used as a flavouring agent.

AZADIRACHTA INDICA.

Indian Azadirach.

N. O. *Meliaceæ.* (*Ind. and Col. Addendum.*)

Syn. B. P.—Neem Bark, Margosa Bark.

Habitat.—India, Eastern Colonies.

Source.—The dried bark of the stem of *Melia azadirachta.*

Characters.—Externally rusty-grey. Internally yellowish, foliated, fibrous. Taste bitter, slightly astringent. Inodorous.

Composition.—A *bitter principle* of a resinous nature is believed to be present in the inner bark.

Official Preparations.

1. **Infusum Azadirachtæ Indicæ.**—Bark 88 grs., Water 20 ozs. for 15 minutes. **B.P. Dose.**—½ to 1 oz.

2. **Tinctura Azadirachtæ Indicæ.**—1 in 10. Bark 2 ozs., Alcohol (45 p. c.) 1 pint. By maceration. **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

Almost every part of the plant is used for medicinal purposes in India.

Externally.—The leaves in the form of a decoction or poultice are largely employed to **stimulate foul** and **indolent ulcers** to a healthier action. The decoction is also used as a local wash or a general bath in many skin diseases. (See p. 65.) Obstinate ulcers have been cured by neem-poultice. Weeping **eczema** quickly heals if a cold poultice of the bruised leaves is applied and allowed to remain on till it drops off. The leaves are said to prevent the ravages of white ants.

The oil extracted from the seeds is considered to be a valuable local **stimulant, antiseptic** and **insecticide**, and is often employed in **chronic rheumatism, chronic scrofulous ulcers** and many **scaly skin diseases.** Some consider it a valuable remedy for **itch.** Alone or in combination with chalmoogra oil or gurjan balsam, it is considered to be an effective application in **leprosy.**

Internally.—The bark is a **bitter tonic, astringent** and **antiperiodic**, the astringent properties residing in the outer layers. Before the introduction of quinine into this country, the bark either in **powder** (1 dr.) or in concentrated decoction, was

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

largely employed by the natives to check ague. Its decoction is employed even now in many cases of malarious fevers where quinine fails to effect a cure, or as a tonic during convalescence. The root bark is said to possess **anthelmintic** properties.

The tree exudes a *gum* which is considered to be a stimulant and tonic, and a *saccharine sap* or toddy which is regarded as having refrigerant, stomachic and alterative properties. The fruits are said to be antiseptic, emollient, purgative and anthelmintic.

BALSAMUM PERUVIANUM.

Balsam of Peru. N.O. *Leguminosæ*.

Habitat—Salvador in Central America.

Source.—A balsam exuded from the trunk of *Myroxylon Pereiræ*.

Characters.—A blackish viscid liquid, in bulk reddish brown, transparent in thin layers. Odor agreeable, balsamic. Taste acrid. *Solubility.*—Insoluble in water, easily in chloroform, and 1 in 1 of alcohol (90 p. c.), but on addition of more alcohol the mixture becomes turbid. *Impurities.*—Copaiba, resins, castor oil and other fatty oils, gurjan balsam and ethylic alcohol.

Composition.—(1) A *volatile oil*, which consists of cinnamin, styracin, peruvin, styrone and benzoate of benzyl. (2) *Cinnamic acid.* (3) *Benzoic acid* (4) *Resins.*

Action.—Stimulant, expectorant.

B.P. Dose.—5 to 15 ms. in emulsion with mucilage, or sugar and yolk of egg with water.

Pharmacology and Therapeutics.

Externally.—On account of the volatile oil it contains, the balsam of Peru is an **antiseptic** and **stimulant** to the skin and abraded surfaces, and may be applied to **wounds, indolent ulcers, bed-sores**, &c. Mixed with vaseline (1 in 7) it cures **sore-nipples** and **cracked lips**. The vapor of the volatile oil **kills pediculi**, and the **acarus scabæi**. It is a more agreeable remedy than the preparations of sulphur, and the method of application is the same (see Sulphur). It allays the itching of **urticaria**, and **eczema**.

Internally.—Like most volatile oils, it is a **stimulant** and **carminative**. During its elimination by the bronchial mucous membrane it **stimulates** and **disinfects** the bronchial **secretion** and is therefore used as an **expectorant** in **chronic bronchitis**. It is also eliminated by the skin and kidneys, and sometimes helps to disinfect and lessen the discharge in **gleet**.

BALSAMUM TOLUTANUM.

Balsam of Tolu. N.O. *Leguminosæ*.

Habitat.—New Granada.

Source.—Obtained by making incisions in the trunk of *Myroxylon toluifera*.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—A soft, tenacious solid when first imported; hardens on keeping; brittle in cold weather; yellowish-brown and translucent in thin films. Odour fragrant. Taste aromatic, slightly acid. *Solubility.*—In alcohol (90 p.c.). *Impurity.*—Spurious articles not answering the B.P. test.

Composition.—(1) *Toluene.* (2) *Benzoic acid.* (3) *Cinnamic acid.* (4) *Tolu-resinotannol.* (5) *Benzyl cinnamate.* (6) *Benzyl benzoate.* (7) *Vanallin.*

Action.—Expectorant. **B.P. Dose.**—5 to 15 grs. in emulsion with mucilage, or yolk of egg and sugar with water.

Enters into.—Tr. Benzoin. Co. and the

OFFICIAL PREPARATIONS.

1. **Syrupus Tolutanus.**—1 in 29. **B.P. Dose.**—½ to 1 dr.
Enters into.—Mist. Ammoniaci. Sweetens cough mixtures.
2. **Tinctura Tolutana.**—1 in 10. Bright reddish-brown.
B.P. Dose.—½ to 1 dr. in emulsion.
Enters into.—Tolu basis for lozenges (see p. 57.)

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Its actions resemble those of balsam of Peru. The syrup is used as a flavoring vehicle for cough mixtures. The tincture is a feeble **expectorant.**

BELÆ FRUCTUS. Bael Fruit.

N.O. *Rutaceæ.* (*Ind. and Col. Addendum*).

Source.—The fresh half-ripe fruit of *Ægle Marmelos.*

Characters.—3 in. in diameter, ovoid or pyriform, smooth. 10 to 15 cells containing wooly seeds. Pulp juicy (?), hard and brittle on drying. Taste mucilaginous, sweetish, astringent.

Composition.—(1) *Tannin.* (2) *Pectin.* (3) *Mucilaginous principles.* (4) *Sugar*, &c.

OFFICIAL PREPARATION.

1. **Extractum Belæ Liquidum.**—1 in 1. Bruised fruit 20 ozs., Water 15 pints, Alcohol (90 p.c.,) *q.s.* By maceration and evaporation. **B.P. Dose.**—1 to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The description of the actions of the bael fruit as given by English writers is inaccurate. The unripe fruit is an **astringent,** while the ripe pulp is a gentle **stimulant** to the intestinal mucous membrane and an **aperient.** Occasionally, however, it causes constipation. The unripe pulp roasted or a decoction made from the unripe slices dried in the sun (*bael suti*), possesses more astringent property than the fresh fruit and is therefore more effectual in **mucous diarrhœa** and **acute dysentery.** The compound or dietetic **bael powder** (powdered

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

pulp 1, arrowroot 1) may be employed in the same class of cases. The ripe pulp is considered to be very serviceable in obstinate **catarrhal diarrhœa, chronic dysentery** and certain forms of **dyspepsia** characterised by alternate constipation and diarrhœa.

The root-bark of the plant is a mild febrifuge and enters into the composition of the "ten roots"—*dasha mula*—so frequently prescribed in mild fevers by the vaids or practitioners of the Hindu system of medicine.

BELLADONNÆ FOLIA.

Belladonna Leaves. N.O. *Solanaceæ*.

Syn.—Deadly Nightshade Leaves, Dwale Leaves.

Habitat.—Britain.

Source.—The fresh leaves and branches of *Atropa belladonna*, collected when the plant is in flower.

Characters.—Leaves alternate below, in unequal pairs above, 3 to 8 in. long, broadly ovate, acute, entire, glabrous, short stalked. Corolla gamopetalous, campanulate, purple.

Identification.—They resemble *Stramonium Leaves*, which are more wrinkled; and *Hyoscyamus Leaves*, which are hairy.

Composition.—(1). *Hyoscyamine*, 0·5 to 0·9 p.c. is the natural alkaloid, which is converted into atropine.

Action.—Anhydrotic, antigalactogogue, anodyne, narcotic, deliriant, mydriatic. A powerful poison.

Official Preparations.

1. **Atropina.**—See p. 262.
2. **Extractum Belladonnæ Viride.**—Green.
B.P. Dose.—¼ to 1 gr.
3. **Succus Belladonnæ.**—Alkaloids 1 p.c. Brownish.
B.P. Dose.—5 to 15 ms.

Non-Official Preparations.

1. **Ext. Bellad. Fol. Alcoholic. B.P.C.**—A soft extract used in the preparation of—

(*a*). **Collodium Belladonnæ B.P.C.** *Syn.*—*Empl. Belladonnæ Fluidum.*—Alkaloids 44 grs. to 1 pint. An anodyne pigment drying quickly.

(*b*). **Empl. Bellad. Virid B.P.C.**—Alcoholic Extract of leaf *q.s.* containing alkaloids 11 grs., Resin Plaster *q.s.* to 10 ozs. M. Is half the strength of the B.P. plaster.

BELLADONNÆ RADIX. Belladonna Root.

Source.—From *Atropa belladonna*, collected in the Autumn and dried.

Characters.—In cylindrical pieces, entire or longitudinally split, ⅛ to ¾ in. thick, 6 to 12 in. long, pale-brownish and wrinkled longitudinally. Fracture short. Internally white, starchy, with no radiate appearance.

Identification.—It resembles *Pyrethrum*, which is unbranched, has

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

a radiate fractured surface and causes a pricking sensation when chewed, and *Scammony*, which is larger.

Composition.—The same as that of the leaves (see above).

Official Preparations.

1. **Atropina.**—See below.
2. **Emplastrum Belladonnæ.**—Alkaloids 0·5 p.c. Standardized. 1 in 6.
3. **Extractum Belladonnæ Alcoholicum.**—Standardized. Alkaloids 1 p.c. Dark semi-solid. **B P. Dose.**—¼ to 1 gr.
4. **Extractum Belladonnæ Liquidum.**—Alkaloids ¾ gr. in 110 ms. Standardized. A dark-brown liquid.
5. **Linimentum Belladonnæ.**—Alkaloids 0·38 p.c. Standardized. Yellowish-brown.
6. **Suppositoria Belladonnæ.**—Alkaloids $\frac{1}{60}$ gr. in each.
7. **Tinctura Belladonnæ.**—Standardized. $\frac{1}{250}$ gr. of alkaloids in 100 ms. **B.P. Dose.**—5 to 15 ms.; 1 m. for a child 1 year old.
8. **Unguentum Belladonnæ.**—Alkaloids 0·6 p.c. Standardized. Brownish.

Non-Official Preparation.

1. **Chloroformum Belladonnæ. B.P.C.**—Prepared like Chlorof. Aconiti (See p. 202.).
2. **Glycerinum Belladonnæ. B.P.C.**—Extract 1 oz., Boiling Water 1 dr., Glycerin *q. s.* to 2 ozs. Rub with water in a warm mortar to produce a smooth paste and mix glycerin.

ATROPINA.

Atropine. $C_{17}H_{23}NO_3$.

Syn.—Atropia.

Source—An alkaloid obtained from Belladonna leaves and root.

As a conversion product, it may also be obtained from *Datura Stramonium* and *Hyoscyamus Niger*.

Characters.—In colorless, acicular crystals. ***Solubility.***—1 in 300 of water, readily in alcohol (90 p.c.), chloroform and ether. The solution is *alkaline*.

Incompatibles.—Caustic alkalis decompose it.

Action.—A virulent poison. A powerful anodyne and sedative. **B.P. Dose.**—$\frac{1}{200}$ to $\frac{1}{100}$ gr. *Max. Dose.*—$\frac{1}{75}$ gr.

Official Preparations.

1. **Atropinæ Sulphas.**—See p. 263.
2. **Unguentum Atropinæ.**—1 in 50. A local anodyne.

Non-Official Preparations and Derivatives.

1. **Oleatum Atropinæ.**—Atropine 5, Oleic Acid 200. Dissolve on a water-bath and mix. An anodyne pigment.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. **Ung. Atrop c. Cocain. L.O.H.**—Atropine 4 grs., Cocaine 10 grs., Soft Paraffin 1 oz. Mix by heat. In ophthalmic practice.

3. **Homatropine** and its salts.—Hydrochloride, hydrobromide (*off*). and salicylate are quick local mydriatics. Their effects do not last long.

4. **Euphthalmine** *Syn.—Hydrochloride of n. Methyl-vinyl-diacetone-alkamine.*—A synthetic compound recently introduced to compete with the natural atropine. A 5 to 10 p.c solution dilates the pupil like homatropine, but its effects are not so lasting. Closely allied to B-Eucaine.

5. **Ephedrine Hydrochloride.**—The salt of an alkaloid obtained from *Ephedra. Vulgaris* Shining white crystals, very soluble in water; 5 to 10 p.c. solution has mydriatic properties.

6. **Eumydrine.**—A derevative of Atropine. A powerful mydriatic, but less poisonous. 1 to 2 p.c. solution dilates pupil in 25 minutes. No ill effects. Dilatation lasts 12 hours.

7. **Mydrine.**—A mixture of Homatropine and Ephedrine in the proportion of 1 to 100. A 10 p c. solution acts quickly, but it causes some burning sensation and the effects are transitory. Can be obtained in the form of "*Sterules.*"

ATROPINÆ SULPHAS. Atropine Sulphate.

$(C_{17}H_{23}NO_3)_2H_2SO_4$.

Source.—Obtained by neutralising atropine with diluted sulphuric acid.

Characters.—In colorless crystals. *Solubility.*—1 in 1 of water, 1 in 10 of alcohol (90 p.c.). The solution is *neutral.*

Action.—Same as that of Atropine. **B.P. Dose.**—$\frac{1}{300}$ to $\frac{1}{100}$ gr. *Max. Dose.*—$\frac{1}{15}$ gr.

Official Preparations.

1. **Lamellæ Atropinæ.**—Each contains $\frac{1}{5000}$ gr.

2. **Liquor Atropinæ Sulphatis**—1 gr. in 110 ms. A colorless solution, which causes pain to the eye. **B.P. Dose.**—$\frac{1}{2}$ to 1 m.

HOMATROPINÆ HYDROBROMIDUM.

Homatropine Hydrobromide. $C_{16}H_{21}NO_3HBr$.

Syn. B.P. (Add. 1890).—Hydrobromate of Homatropine.

Source.—The hydrobromide of an alkaloid prepared from Tropine.

Atropine splits up into tropic acid and tropine under the action of barium hydrate. Tropine, combined with amygdalic acid and acted upon by diluted hydrochloric acid, forms *Homatropine.*

Characters.—A white crystalline powder or aggregation of minute trimetric crystals. *Solubility.*—1 in 6 of water, 1 in 8 of alcohol (90 p.c.).

Action.—Mydriatic. **B.P. Dose.**—$\frac{1}{30}$ to $\frac{1}{20}$ gr.

Official Preparation.

1. **Lamellæ Homatropinæ.** —$\frac{1}{100}$ gr. in each.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparation.

1. **Oleum Homatrop. c. Cocaina. L.O.H.**—Homotropine (pure) 10 grs., Cocaine (alkaloid) 10 grs., Castor oil 1 oz. Dissolve by heat.

Pharmacology.

Externally.—The unbroken skin absorbs the alkaloids of belladonna if combined with alcohol, chloroform, glycerin or fat. Exposed mucous surfaces and raw skin absorb them more rapidly. Both belladonna and atropine powerfully paralyse the peripheral terminations of the sensory nerves, especially if there is pain, and are therefore **local anæsthetics** and **anodynes.** To a much less extent they paralyse the terminations of the motor and secretory nerve-endings, *e.g.*, the nerves of the sweat and milk glands. Hence they are **local anhydrotics** and **antigalactogogues.** The blood vessels of the part first contract and then dilate.

Internally.—Atropine readily enters the blood and circulates unaltered without affecting the blood corpuscles. It chiefly affects the nervous system: other organs and tissues are indirectly influenced through its action on their special or secretory nerves. Therefore we will first notice its actions on the nervous system proper and afterwards on other organs of the body.

Nervous system.—The action of belladonna on the nervous system is most important, as through its agency all other actions in the body are performed.

1. *Cerebrum.*—In medicinal doses belladonna scarcely produces any effect on the convolutions, but in large doses it is a **deliriant,** causing incoherent delirium and constant desire to move about, disordered vision, and insensibility. No true **coma** even after large doses. The quietude which follows the delirium is merely the result of nervous exhaustion.

2. *Medulla and cord.*—Two chief centres are powerfully affected by belladonna, *viz*, (*a*) the **respiratory** and (*b*) the **vasomotor.** The vagal centre is affected to a much less extent. It also slightly increases then diminishes the **reflex excitability.** It causes tetanus in frogs, but not in man.

3. *Sensory nerves.*—Belladonna, whether locally applied or given by the mouth, paralyses the peripheral terminations of the **sensory nerves** and thereby relieves pain if present. It is therefore a **local** and **general anodyne.** Its action is not so powerful as that of atropine. As a general anodyne atropine is inferior to morphine.

4. *Motor nerves and voluntary muscles.*—The motor nerves are slightly paralysed towards the end, but the voluntary muscles are never affected.

5. *Splanchnics and intestine.*—Small doses paralyse the **inhibitory fibres of the splanchnics supplying the intestinal walls** and thus increase peristalsis and cause re-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

laxation of the bowels (see p. 128). Large doses arrest peristaltic movements, but the muscular coat retains its irritability. The sensory and vasomotor fibres are not affected.

6. *Nerves of the bladder, urethra, uterus*, &c.—The terminations of the nerves supplying the involuntary muscles of the bladder, urethra, ureter, vesiculæ seminales, uterus and vagina are paralysed.

7. *Third nerve in the eye.*—Atropine dilates the pupil whether locally applied or given by the mouth. This is due to **paralysis of the terminations of the third nerve** in the iris. The muscular fibres of the iris are not affected, as contraction of the pupil occurs if the muscle itself be stimulated. It also paralyses the termination of the same nerve in the ciliary muscle. Hence it is a powerful **local** and **remote mydriatic** and **paralyser of accommodation** (see p 162). So powerful are the local effects of atropine on the eye, that it can dilate the pupil in a recently excised eye, and also that of an eye the third nerve of which has been divided. As the pupil dilates of itself after division of the third nerve, the further dilatation of such a dilated pupil after the application of atropine must be due to the stimulation of the sympathetic fibres in the iris. In large doses it **increases intra ocular tension.** The action of atropine on the eye is not central but direct.

8. *Vagal ends in the heart.*—The vagus is the inhibitory nerve of the heart. Belladonna **stimulates the endings of the vagus** in the heart, causing slowing of the pulse, but this is quickly followed by paralysis rendering the **pulse-beat more rapid.** This rapidity cannot be diminished by stimulating the vagus. At times the excitement becomes so strong that the heart-sounds may be heard a few feet from the patient. With the acceleration of the pulse, belladonna **does not reduce the force and tone of the heart.** According to some authorities, the frequency of the pulse is to some extent also due to slight stimulation of the cardiac accelerator nerves. The vagal centre and trunk are also slightly paralysed, and the primary slowing of the pulse, according to some authorities, may be due to the excitation of this centre. In toxic doses the heart is paralysed and stops in diastole.

9. *Vagal ends in the bronchial walls.*—Both the **afferent and efferent terminal ends of the filaments of the vagus are paralysed** after a brief stimulation, producing **relaxation** of the muscular coat of the tubes, and diminishing the **sensibility** and **reflex action** (paralysis of the afferent fibres). Thus belladonna is a **bronchial antispasmodic.** It also diminishes the bronchial secretion.

The **respiration** becomes **quicker** and **deeper** by the stimulation of the medullary and spinal respiratory centres, but large doses paralyse it and make it **shallow** and **slow.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

10. *Vasomotor nerves and the skin.*—Like its action on the vagal centre, belladonna in full doses first **stimulates** then **paralyses** the vasomotor centre in the medulla. As a result of this, the peripheral blood-vessels first **contract** and then **widely dilate**. During this period of contraction, the **blood-pressure rises considerably**. This is also greatly helped by the simultaneous acceleration of the heart's action from the paralysis of the cardiac vagal terminations With the dilatation of the blood-vessels, the **blood pressure falls.** The spinal vaso-motor centres are only brought into action when the heart is paralysed and the blood-pressure is extremely low. The **flushing** or **scarlatiniform** or **erythematus rash** on the skin so often seen in belladonna poisoning is no doubt due to the dilatation of the peripheral blood-vessels.

11. *Secretory nerves.*—Atropine is a powerful **paralyser of almost all the secretory nerve-endings** in the body, thereby exercising a most powerful depressant influence on the secretions of most of the secretory organs. Its action on these organs are given below :—

(*a*) *Salivary and mucous glands.*—Even in small doses atropine powerfully **paralyses the terminations of the secretory fibres of the chorda tympani,** but not the vaso-dilator ones, so that stimulation of the chorda tympani does not stimulate the flow of saliva from the submaxillary gland, though its vascularity is increased. It also depresses the termination of the secretory nerves of the salivary and mucous glands. Consequently, the mouth, palate and throat become dry and red. After large doses the dryness increases so much that deglutition becomes impossible. Hence atropine is a powerful **antisialagogue** (see p.p. 122)

(*b*) *Gastro-intestinal glands.*—Recent researches go to prove that atropine greatly lessens the percentage of HCl secreted by the stomach, without very much affecting the secretion of pepsin. But after prolonged use the gastric glands cease to respond to it.

(*c*) *Liver and pancreas.*—According to Brunton and others, their secretions are diminished.

(*d*) *Bronchial glands.*—The secretion of the bronchial and tracheal mucus is very much diminished.

(*e*) *Sweat-glands.*—Whether locally applied or given by the mouth atropine powerfully checks sweating. This it does by paralysing the terminations of the secreting nerves. It is therefore a **local** and **general anhydrotic.**

(*f*) *Mammary glands.*—In the same manner the secretion of milk is also arrested. Hence it is a **local** and **remote antigalactogogue.**

(*g*) *Lachrymal glands.*—Prolonged use of atropine arrests their secretion.

(*h*) *Kidneys.*—Here its action is uncertain. Sometimes it

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

causes **diuresis.** Large doses cause retention of urine as the result of paralysis of the bladder.

Temperature.—Belladonna in toxic doses raises the temperature of the body by 3 or 4 degrees. Hence it is a true **calori-crescent.** As the circulation fails, the temperature falls.

Elimination.—Atropine is excreted unaltered by the urine within 10 to 20 hours. It increases urea, phosphates, sulphates but not chlorides in the urine.

Toleration.—Children can bear large doses of belladonna (see p 117). Old people bear it badly. Pigeons and rodents are insusceptible to it.

Summary of actions.—(1) Atropine paralyses the terminal ends of (*a*) the sensory, (*b*) the secretory and (*c*) the third nerve. (2) It is a deliriant. (3) It first stimulates and then depresses the three **vital centres**—(*a*) respiratory, (*b*) vagal and (*c*) vaso-motor. (4) It paralyses the inhibitory fibres of the splanchnics. (5) Causes flushing of the skin and increase of temperature.

Methyl and Ethyl-atropines do not cause tetanus in frogs and paralyse the motor ends, but they act like atropine on the eye, heart, &c.

Acute toxic action.—The symptoms that follow a moderate dose of atropine are dryness of the mouth and throat with difficulty of swallowing, dilatation of pupils, confused vision, dry skin and slow pulse. Larger doses bring on these symptoms more quickly. The face, conjunctiva and skin are flushed, the pulse becomes frequent, sometimes doubled. The patient feels giddy, staggers, and is delirious. The skin becomes hot, uniformly red or erythematous; pupils widely dilated; bowels relaxed: micturition difficult and painful; respiration slow and deep; unconsciousness alternating with delirium and death from cardiac paralysis combined with asphyxia. At the *post mortem* all organs are in a state of venous congestion due to asphyxia.

The symptoms of poisoning have been observed after the application of plaster, glycerin of belladonna or liniment.

Antidotes.—Emetics or pump Tannin, tea, charcoal. Morphine, caffeine or pilocarpine hypodermically. Physostigmine and chloral hydrate are also recommended. Stimulunts, hot bottles, artificial respiration. As the poison is eliminated by the urine, the bladder is to be emptied now and then by the catheter to prevent reabsorption.

Physiological antagonists.—Morphine, pilocarpine, physostigmine, aconitine, chloral hydrate, hydrocyanic acid, muscarine, &c. Of these the first three are the most powerful.

THERAPEUTICS.

Externally. **Skin.**—As a local *anodyne*, belladonna in the form of liniment, plaster or ointment is largely employed to soothe irritability or pain in **neuralgia**—especially intercostal and supra-orbital—**soreness of muscles**, as of the chest in **phthisis**, **pleurodynia**, **hyper-sensibility** and **pruritus** of the skin, **acute gout** and **rheumatism**, &c. Chloroformum Belladonnæ

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

B.P C., Ung. Atropinæ or Oleat. Atropinæ are most powerful in this respect. Occasionally atropine injected subcutaneously as near the nerve as possible does more good in neuralgia, especially in **sciatica**, than any local applications. As an *anodyne* and *antiphlogistic*, Glycerinum Belladon. or Collodium Belladonnæ may be used in **boils, threatening abscesses, carbuncles, ovaritis, orchitis, erysipelas, pelvic cellulitis**, &c. Liniment of belladonna rubbed in three or four times a day, or a hypodermic injection of atropine in obstinate cases, checks **local sweating**. In the form of an ointment either alone or better still with conium, belladonna lessens the spasm of **anal fissure** and the pain and irritation of **piles**.

Female diseases.—As an *antigalactogogue* or *antiphlogistic*, belladonna is very useful in stopping the secretion of milk, or in subduing the inflammation of the breast of the mother, who for some reason or other is unable to nurse her child. For this purpose the liniment will be found the cleanest application. Belladonna plasters are very messy and soil the patient's linen. Extract of belladonna with glycerin (5 to 10 grs. to 1 oz.) in cotton wool may be used as a pessary in **inflammation** of the **womb** or **cervix**. A pessary containing alcoholic extract 2 grs., tannic acid 7 grs. and cacao-butter *q.s.* is very serviceable in **leucorrhœa** with **ulcerated os**. A suppository containing alcoholic extract 1 gr. is an excellent application to relieve the pain of spasmodic and neuralgic **dysmenorrhœa**.

Eye.—A solution of atropine is dropped into the eye to dilate the pupil and paralyse the accommodation in many conditions already noticed in page 162. Where only temporary mydriasis is required, as in estimating errors of refraction, homatropine should be used in preference to atropine as the effects pass off more quickly and there is less likelihood of toxic effects from absorption. Euphthalmine is also useful for the same purpose, and it has the advantage of not irritating the conjunctiva.

Internally. **Alimentary canal.**—Atropine sometimes checks **mercurial salivation**. In small doses, frequently repeated, alone or in combination with aconite, belladonna (Tr.) checks **acute tonsillitis**. The extract is often combined with purgatives either to increase their activity or lessen griping. As an indirect *aperient*, in very minute doses it may be given in **habitual** or **chronic constipation** and **painful defæcation**. In **obstinate constipation** Trousseau recommends the extract, $\frac{1}{6}$ to $\frac{1}{4}$ gr., night and morning. A suppository containing 1 or 2 grs. of the extract often causes an easy motion when strong purgatives have failed.

Alone or with opium, the alcoholic extract is very effective in **intestinal obstruction, peritonitis, enteritis** and **appendicitis**. It also relieves the pain of **biliary, intestinal** and

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

lead colics by paralysing the sensory nerve-terminations and relaxing the involuntary muscular fibres.

Heart and circulation.—Belladonna relieves palpitation, pain and distress of the heart. For this purpose a plaster is often applied over the cardiac region. As it increases the action of the heart without lowering its force and relaxes the arterioles, it is of immense value in those cases where we want to empty the ventricles completely, as in **angina**. In cases where a patient with a weak heart is to be placed under chloroform, atropine may be injected subcutaneously as a preliminary precaution.

Respiratory tract.—Belladonna is extremely useful in many spasmodic affections of the air-passages, such as **asthma, spasmodic bronchitis** and **whooping cough.** The writer uses with great benefit the subcutaneous injection of atropine in spasmodic asthma. In whooping cough it must be given freely before we may expect any decided improvement. In **nasal catarrh** with profuse discharge atropine gives immediate relief. Hausmann recommends its hypodermic injection ($\frac{1}{150}$ gr.) in **hæmoptysis** when ergot fails.

Skin.—Atropine (1 to 2 ms. of the solution, or $\frac{1}{100}$ gr. hypodermically) arrests **excessive sweating.** It is therefore an excellent remedy for **night-sweats** of **phthisis.** Extract of Belladonna acts equally well, especially when combind with Zinc oxide.

Nervous system.—Belladonna is now rarely used in nervous diseases. It may be given in **frontal headache** and **sciatica** and is said to control **delirium** in fevers. Touvime recommends atropine in **delirium tremens.** He says that a single hypodermic injection of $\frac{1}{60}$ gr. sometimes calms delirium and brings on a refreshing sleep.

Genito-urinary tract.—It is the only drug which may be of some use in **incontinence of urine** in children. It may stop **nocturnal emissions** in persons whose genitals are weak and relaxed, and when discharge takes place without dream or orgasm. But extract of Hyoscyamus and camphor are better for this purpose. It is very useful in allaying the pain and helping the expulsion of **renal calculi,** but in order to obtain these effects it must be given in large doses until toxic action is produced (W. Murray). **Cystitis, dysuria, urethral spasms** and, in fact, any kind of pain in the pelvic organs can be removed by belladonna either administered in the form of a suppository or by the mouth.

Antidote to poisons.—Atropine may be successfully used as a physiological antidote in poisoning by morphine, physostigmine, chloroform, aconite, poisonous mushrooms (muscarine), nitro-glycerin, pilocarpine, gelsemine and hydrocyanic acid.

Prescribing hints.—A porous belladonna plaster is the best to use as it causes less itching and irritation. For application

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

to the female breast, it should be shaped as directed in page 96, or cut in two or three places so as to fit it. Collodion belladonna may be painted over an uneven surface in its stead. Atropine may be given in tablets, pills or in solution. Hypodermically it is often combined with morphine to counteract its unpleasant physiological effects and to increase its sedative virtue. 10 minims of the tincture every 4 hours to young children for *whooping cough*; and 30 to 40 ms. of the same every 1 or 2 hours during an *attack of renal colic* until atropism—dryness of the throat, dilatation of the pupils and delirium—sets in are not unsafe to use in those particular cases. Caustic fixed alkalis destroy the alkalolds of belladonna, but carbonates and bicarbonates of sodium and potassium do not do so.

Homatropine hydrobromide may be applied either in solution (4 grs. in 1 oz. of water), or as a disc, or dissolved in castor oil with cocaine. The object of mixing it with castor oil is to prevent it from being washed away by the tears.

BENZOINUM. Benzion.

N.O. *Styraceæ.*

Syn.—Gum Benjamin. **Syn. I.V.**—*Lobán*,

Habitat.—Siam and Sumatra.

Source.—A balsamic resin obtained from *Styrax benzoin* and other species of Styrax. Commercially known as Siam and Sumatra benzoin.

Characters.—*Siam benzoin.*—In flat or curved reddish-brown tears, 2 in. long, ½ in. thick; milky white internally. *Sumatra benzoin.*—In masses of agglutinated tears, having a white and reddish-brown marbled or mottled or granite-like appearance. Brittle, softens when warm and yields fumes of benzoic acid when heated. Odor agreeable, like vanilla in the case of Siam, and like storax in the case of Sumatra benzoin. *Solubility.*—In alcohol (90 p.c.) and solution of potassium hydroxide.

Identification.—See Ammoniacum, p. 226.

Composition.—(1) *Benzoic acid* 12 to 20 p.c. (2) *Cinnamic acid* a trace. (3) *Volatile Oil.* (4) *Resins.*

Action.—Expectorant, diuretic.

Enters into.—Adep. Benzoat., Ung. Cetacei and the

Official Preparation.

1. **Tinctura Benzoini Composita.** *Syn.*—*Friar's balsam.* **B.P.** **Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Tr. Benzoini Simplex. B.P.C.**—Benzoin 2, Alcohol (90 p.c.) *q.s.* By maceration to 20.

2. **Ung. Benzoini.**—Benzoin 1, Adeps 4. M. In chronic ulcers.

3. **Vapor Benzoini.**—1 dr. in 1 pint. at 140° F. A soothing sedative in bronchial irritation.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ACIDUM BENZOICUM.

Benzoic Acid. $C_6H_5.COOH$.

Source.—Obtained from benzoin by sublimation. Also from toluene, hippuric acid and other organic compounds. In commerce we find 4 varieties :—(1) *Resin Sublimed Acid*, (2) *Resin Precipitated Acid*, (3) *Hippuric Benzoic Acid* and (4) *Toluene Benzoic Acid.*

Characters.—In light, feathery, colorless and odorless crystalline plates or needles. *Solubility.*—1 in 400 of cold, 1 in 17 of boiling water, 1 in 3 of alcohol (30 p.c.), 1 in 7 of chloroform, and in fixed and volatile oils; also in the solutions of alkalis and of calcium hydroxide. Sodium phosphate or borax aids solubility in water. Volatalises in the vapor of water. *Impurities.*—Hippuric, cinnamic, oxalic and chloro-benzoic acids.

Action.—Antiseptic, stimulating expectorant, diuretic.

B.P. Dose.—5 to 15 grs.

Enters into.—Tr. Camph. Co., Tr. Opii Ammoniata and the

OFFICIAL PREPARATION.

1. **Trochiscus Acidi Benzoici.**—½ gr. in each. *Dose.*—1 to 5.

AMMONII BENZOAS.

Ammonium Benzoate. $C_6H_5.COONH_4$.

Source and **Characters.**—Colorless laminar crystals, prepared by neutralising solution of ammonia with benzoic acid. *Solubility.*—1 in 6 of cold water, 1 in 30 of alcohol (90 p.c.) and 1 in 8 of glycerin.

Impurities.—Free acid, sulphates and chlorides.

Incompatibles.—Ferric salts, acids, liq. potassæ.

Action.—Diuretic. **B.P. Dose.**—5 to 15 grs. in solution.

SODII BENZOAS.

Sodium Benzoate. C_6H_5COONa.

Source and **Characters.**—A white, inodorous, amorphous or crystalline powder with a faint benzoic odor; prepared by neutralising benzoic acid with sodium carbonate. *Solubility.*—1 in 2 of water, 1 in 24 of alcohol (90 p.c.) *Impurities.*—Many metals and salts.

Action.—A powerful hepatic stimulant and diuretic. **B.P. Dose.**—5 to 30 grs. in solution.

NON-OFFICIAL DERIVATIVES OF BENZOIC ACID.

1. **Potassii Benzoas.**—A soluble, crystalline salt. In lithic acid diathesis, cystitis. *Dose.*—15 to 30 grs.
2. **Sodii Hippuras.**—A soluble white amorphous powder. A solvent of urates in gout and gravel. *Dose.*—5 to 30 grs.
3. **Calcii Hippuras.**—Shining white crystals. *Dose.*—5 to 20 grs.
4. **Pyrenol.** *Syn.*—*Benzoyl.-thymol-sodium-Oxybenzoate.*—Aromatic, white hygroscopic crystalline powder. Antipyretic and antineuralgic. *Dose.*—8 to 12 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology of Benzoin and Benzoic Acid.

Externally.—Both benzoin and benzoic acid are **antiseptics**, superior to carbolic and salicylic acids. A concentrated solution is a **local stimulant** and **irritant.**

Internally. **Gastro-intestinal canal** and **liver.**—The salts are less irritant and are therefore used in preference to the acid. In small doses they have little effect on the stomach and intestine, but in large doses **irritate** them. They are **hepatic stimulants** increasing both the quantity and solids of the bile. The acid is an **intestinal disinfectant.**

Respiratory tract.—Both the gum and acid cause sneezing when inhaled. Their vapor directly stimulates the bronchial secretion, which is also remotely stimulated during their excretion when given by the mouth. Hence they are **stimulant expectorants.** They also disinfect the secretion.

Urinary tract.—Benzoic acid and its salts are largely excreted with the urine, partly unchanged, but chiefly as **hippuric acid** Occasionally, succinic acid also appears in the urine. The appearance of hippuric acid in the urine is due to the decomposition of benzoic acid in the presence of glycocoll in the al cells but not in the blood; thus.—$C_7H_6O_2$ (benzoic acid) + C_2H O_2 (glycocoll) = $C_9H_9NO_3$ (hippuric acid) + H_2O. The origin of gly cocoll is not known, but the fact of the conversion of the b oic acid taking place in the kidneys is proved by the follo ng experiments:—(1) If benzoic acid is given in large doses, it is found unchanged in the blood, and if the renal arteries are tied no hippuric acid is generated, though it is formed if the ureters are tied. (2) Benzoic acid is converted into hippuric acid if the blood containing the former but no glycocoll is slowly passed through the kidneys immediately removed after death. (3) When hippuric acid is given by the mouth, benzoic acid is detected in the blood and hippuric acid in the urine. Hippuric acid thus formed performs most important functions. It **stimulates the activity of the renal cells** and **renders the alkaline urine acid.** Hence benzoic acid and benzoates are **diuretics** and **acidifiers** of alkaline urine. It is said that the conversion to hippuric acid does not occur in diseased kidneys. Over the mucous membrane of the urinary tract, they have a soothing, disinfecting and alterative influence.

Temperature.—Benzoic acid and benzoates are **antipyretics,** sometimes acting more powerfully than salicylic acid, but how they act is not known.

Metabolism.—They are believed to increase tissue metamorphosis.

Elimination.—Chiefly with the urine, and partly with the sweat, saliva and bronchial secretion, which are stimulated to a slight extent.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

THERAPEUTICS.

Externally.—A piece of lint soaked in Friar's balsam may be used to stop bleeding from, and promote the healing of, **fresh wounds**. In the same manner it may be used as an effective dressing for **ulcers** of all sorts. Undiluted Friar's balsam injected into **sinuses** establishes a healthier action in these tracts and heals them quickly. Locally applied, it relieves the pruritus of **urticaria** and in solution (5% of the compound tincture with 5% of glycerin in 1 oz. of water) it is a soothing stimulant application for the skin after the cure of **acne**. Benzion is mixed with lard to prevent its decomposition, but it occasionally causes irritation of the skin.

Internally. **Lungs**—Both benzoin and benzoates are largely employed either by the mouth or as an inhalation, in chronic **bronchitis** and **phthisis**, particularly if the expectoration is foul and scanty. The vapour of the tincture has been found to cut short with surprising rapidity attacks of **catarrh** and **influenza**.

Urinary tract.—As an *acidifier* of alkaline, decomposing urine in **cystitis**, **pyelitis** or **phosphatic calculi**, benzoic acid and benzoates are most valuable. The salts should be used in preference to the acid, as they cause less gastro-intestinal irritation. They may be combined with urinary sedatives, such as Tinct. hyoscyami.

Rheumatism and gout.—Benzoic acid may be given in **acute rheumatism** when salicylate of sodium cannot be borne or fails to do good. In **gout** it is occasionally used with the idea that it converts uric acid into hippuric acid and thus helps its elimination.

Prescribing hints.—The acid may be given in cachets, pills, or mixtures suspended by mucilage. Chloroform disguises its taste. The vapour may be inhaled through an inhaler or even directly from a bottle.

BENZOL. Benzol.

Source.—A mixture of homologous hydrocarbons obtained from light coal-tar oil. It contains about 70 p.c. of benzene C_6H_6, and 20 to 30 p.c. of toluene C_6H_5, CH_3.

Characters.—A colourless, volatile liquid; odour strong, characteristic. Sp. gr. 0·880 to ·0858.

Dose.—5 to 10 ms. in capsule, or oily solution.

PHARMACOLOGY AND THERAPEUTICS.

Has been used internally for **whooping cough** and in **influenza**.

Quickly destroys **pediculi capitis** or **pubis**; one application usually sufficient. Useful in **seborrhœa** and **scabies**. Used in Pharmacy as a solvent for India rubber.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

BERBERIS. Berberis.

N.O. *Berberideæ.* (*Ind. and Col. Addendum.*)

Syn. I.V.—*Dáruharidrá káshta*, Beng. *Dárhald, chatra*, Hind.
Habitat.—India, Eastern Colonies.
Source.—The dried stem of *Berberis aristata.*
Characters.—Undulating pieces 1 to 2 in. thick, covered with orange-brown periderm. Bright yellow. Odour faint. Taste bitter.
Composition.—Two alkaloids—(1) *Berberine* and (2) *Oxycanthine.*

Official Preparations.

1. **Liquor Berberidis Concentratus.**—Berberis 10 ozs., Alcohol (20 p.c.) 25 ozs. or *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.
2. **Tinctura Berberidis.**—Berberis 2 ozs., Alcohol (60 p. c.) *q. s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Ext. Berberidis.**—An impure watery extract from the wood and bark of several species of Berberis sold in the Indian bazars under the name of **Rasot**, which can be purified by dissolving it in alcohol (90 p.c.) and evaporating it to a pilular consistence. *Dose.*—30 to 60 grs.
2. **Inf. Berberidis.**—1 in 20 of boiling water for 1 hour.
Dose.—1 to 2 ozs.
3. **Berberine Carbonate, Hydrochloride, Phosphate** and **Sulphate** are yellow crystals more or less soluble in water.
Dose.—1 to 5 grs.

Pharmacology and Therapeutics.

Externally.—Being a mild **local astringent** *Rasot* is often employed by the natives of India with benefit as a pigment around the eyes in acute and chronic **ophthalmia.** It is often combined with alum and opium.

Internally.—Berberis is a mild **astringent, bitter tonic** and **stomachic** in small doses, and **diaphoretic, antipyretic antiperiodic** and a gentle but certain **aperient** in large doses It is chiefly used in fevers. Its diaphoretic and antipyretic properties, according to some authorities, are equal to those of quinine and Warburg's tincture. Dr. W. B. O'Shaughnessy speaks very highly of *Rasot* in **intermittent fever.** He says that "in no instance was headache or constipation produced, but we have seen *Rasot* exasperate the symptoms of chronic dysentery and hepatitis when combined with ague." As an alterative tonic, Berberis may be used in **scrofulous** and **syphilitic diseases,** and as an astringent, tonic and alterative in **chronic intestinal catarrh.** It checks the vomiting of pregnancy.

BETEL. Betel.

N. O. *Piperaceæ.* (*Ind. and Col. Addendum.*)

Syn. I.V.—*Pán*, Beng. *Pán, támbuli*, Hind.
Habitat.—India, Eastern Colonies.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—The leaves of *Piper betel*.

Characters.—Broadly ovate, acuminate, obliquely cordate at base, glossy on upper surface. Taste warm, aromatic, bitter.

Composition.—(1) Two *Aromatic Oils*, light and heavy, which treated with caustic potash yields *chavicol*, a phenol having powerful antiseptic properties (2) An alkaloid *Arakene* with properties somewhat allied to cocaine. The characteristic odour of the leaves and oil is due to "betel-phenol."

PHARMACOLOGY.

Externally.—Dry betel-leaf has no action. Fresh betel-leaf is a gentle **stimulant** to the skin, due no doubt to the volatile oils it contains.

Internally.—When chewed the fresh leaf is a mild, aromatic **sialagogue**, allaying thirst and dryness of the mouth. It also removes foulness of the breath. The juice stimulates the gastric vessels and nerves and thus acts as a **stomachic** and **carminative.** It is said to possess mild **astringent** and **expectorant** virtues. The warm juice is considered a **febrifuge.** Too much chewing of **pan** blunts hunger probably because of the presence of alkaloid *Arakene.* If taken in excess it may cause intoxication somewhat similar to that of alcohol.

THERAPEUTICS.

Externally.—As an easily available domestic remedy, betel-leaf is used for various purposes. Smeared with mustard oil or *chunam* (hydrated slaked lime) and warmed, it is applied to the temples in **headache,** to the neck in **sore-throat,** to **swollen glands** to promote their absorption and to the breasts to check the secretion of milk. The writer applies the juice mixed with chunam (2 to 1) and warmed in these cases with good results. In catarrhal and pulmonary affections of children, the leaves smeared with oil and warmed are applied in layers to the chest, relieving both cough and dyspnœa. The leaves may be similarly employed in hepatitis, orchitis, ovaritis, &c. The Bengal betel leaves are most valuable in these cases. They are used as dressings for foul ulcers or as substitutes for oiled silk or gutta-percha tissue. The juice is sometimes dropped into the eye in **ophthalmia** or into the ear (warmed) to relieve earache. The stalk of the leaf smeared with oil is introduced into the rectum in **constipation** and flatulence of children.

Internally.—The natives of India chew prepared *pan*, which is made by wrapping slices of areca nut with a proportionate quantity of catechu, chunam and spices in betel leaves. This combination is very efficacious in **ulcerated** and **spongy gums,** and as a digestive adjuvant in **dyspepsia.** Prepared *pan* is an excellent masticatory for removing the after-taste of bitter and nauseous drugs, and dryness of the mouth in Bright's disease and diabetes.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

The juice may be given as an expectorant in colds and coughs or as a febrifuge in the catarrhal fever of children.

BISMUTHI CARBONAS.

Bismuth Oxycarbonate. $(Bi_2O_3CO_3)_2, H_2O$.

Source.—May be prepared by the interaction of bismuth nitrate and ammonium carbonate (Bismuth nitrate is not official).

Characters.—A heavy whitish powder insoluble in water, soluble in nitric acid and water. *Impurities.*—The same as those of the subnitrate.

Action.—Antacid, gastric sedative. **B.P. Dose.**—5 to 20 grs.

Official Preparation.

1. **Trochiscus Bismuthi Compositus.**—*Dose.*—1 to 6.

BISMUTHI OXIDUM.

Bismuth Oxide. Bi_2O_3.

Source.—Prepared by boiling bismuth oxynitrate with solution of sodium hydroxide. $2BiONO_3 + 2NaHO = Bi_2O_3 + 2NaNO_3 + H_2O$.

Characters.—A slightly brownish-yellow powder insoluble in water, but soluble in nitric acid mixed with half the volume of water. *Impurities.*—The same as those of the subnitrate.

Action.—Similar to the subnitrate. **B.P. Dose.**—5 to 20 grs.

Non-Official Preparations.

1. **Bismuthi Oxidum Hydratum.**—A white amorphous powder which mixes readily with water to form **Bismuth Cream** (1 in 4).
2. **Ung. Bismuthi Oxidum.**—Bismuth Oxide 1, Oleic Acid 8, White Wax 3, Soft Paraffin 9. Mix by the aid of heat.

BISMUTHI SALICYLAS.

Bismuth Salicylate. $C_6H_4 \cdot OH \cdot COO.BiO$.

Source—May be prepared by the interaction of bismuth nitrate and sodium salicylate.

Characters.—A white, heavy, amorphous powder insoluble in water and alcohol (90 p.c.). *Impurities.*—The same as those of the bismuth subnitrate.

Action.—Gastro-intestinal sedative, antiseptic.

B.P. Dose.—5 to 20 grs.

Non-Official Derivatives.

1. **Bismuthi et Cerii Salicylas.**—A double salt useful in sea-sickness, diarrhœa, dysentery and ulcerated bowels. *Dose.*—5 to 20 grs.
2. **Thioform.** *Syn.—Basic Dithio-Salicylate of Bismuth.*—An antiseptic desiccant.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

BISMUTHI SUBNITRAS.

Bismuth Oxynitrate. $BiONO_3,H_2O$.

Source.—Prepared by the interaction of bismuth nitrate and water. $5(Bi_3NO_3)+8H_2O=4(BiONO_3H_2O)+2NO+4H_2O$.

Characters.—A heavy, white, inodorous powder consisting of minute crystalline scales; reaction slightly acid. *Solubility.*—Insoluble in water. *Impurities.*—Nitrates, chlorides, tellurium, arsenic, lead.

Incompatibles.—Alkaline carbonates, potassium iodide.

Action.—Sedative, astringent both externally and internally.

B.P. Dose.—5 to 20 grs.

Official Preparations.

1. **Liquor Bismuthi et Ammonii Citratis.** *Syn. B.P.*—*Liquor Bismuthi.*—3 grs. of Bismuth Oxide in 1 dr. A colourless, neutral or slightly alkaline solution with a metallic taste. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Liq. Bismuthi Conc. B. P. C.**—*Dose.*—15 to 30 ms.
2. **Mist. Bismuth. Comp. B.P.C.**—Morph. Hyd. 8 grs., Water 4 drs.; dissolve and add Tr. Card. Co. 3 ozs., Chloroform 70 ms., Ext. Nux. Vom. Liq. 135 ms., Acid Hydrocyan. Dil. 320 ms.; mix and add Liqr. Bismuth. Conc. B.P.C. 15 ozs. and water to 1 pint. *Dose.*—20 to 30 ms.
3. **Pulv. Bismuthi Co.** *Syn.*—*Ferrier's Snuff.*—Bis. Subnitrate 6 drs., Morph. Hyd. 2 grs., Powdered Acacia Gum 2 drs. Mix. Useful in coryza. A pinch each time till the nostrils are cleared.
4. **Lotio Bismuthi. B.S.H.**—Subnitrate 10 grs., water 1 oz. A sedative lotion in eczema.
5. **Ung. Bismuthi.**—Subnitrate 1 in lard 8.

Additional Derivatives of Bismuth.

1. **Bismuthi Albuminate.** *Syn.*—*Bismulose.*—*Dose.* 20 to 60 grs.
2. **Bis. Beta-Naphtholate.** *Syn.*—*Orphol.*—Less irritating than naphthol. A gastro-intestinal antiseptic and astringent. *Dose.*—10 to 30 grs.
3. **Bis. Benzoate.** *Syn.*—*Bis. Oxybenzoate.*—A white, impalpable, antiseptic powder used for stimulating indolent ulcers and chancres. *Dose.*—5 to 20 grs.
4. **Bis. Citrate.**—A white powder slightly soluble in water. *Dose.*—2 to 5 grs.
5. **Bis. Lactate.**—Useful in gastrodynia. *Dose.*—5 to 20 grs.
6. **Bis. Loretinate.**—Dusted on ulcers or wounds like iodoform. Internally in phthisical diarrhœa. *Dose.*—5 to 10 grs.
7. **Bis. Naphthalin-benzoate.** *Syn.*—*Intestin.*—Acts like Orphol.
8. **Bis. Oleate.**—A bland non-irritating demulcent.
9. **Bis. Oxychloride.**—Impalpable non-irritating powder, used as a cosmetic and as a sedative coating in irritable conditions of the mouth, throat, vagina and rectum. *Dose.*—5 to 20 grs.
10. **Bis. Oxyiodide.**—A brownish-red, amorphous powder insoluble in water. Used like iodoform. *Dose.*—5 to 10 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

11. **Bis. Oxyiodogallate.** *Syn.—Airol.*—A greyish-green powder used as a substitute for iodoform, and injected as an emulsion with glycerin (10 p.c.) in gonorrhœa.

12. **Bis. Oxybromide.**—A yellowish fine powder. Used in hysterical dyspepsia with gastric pains and vomiting. *Dose.*—10 to 15 grs.

13. **Bis. Peptonate.**—A brown powder containing 3½ p.c. of bismuth oxide. Very easily assimilable. *Dose.*—1 dr.

14. **Bis. Phosphate.**—A soluble white powder, in acute gastric and intestinal catarrh. *Dose.*—80 grs. daily.

15. **Bis. Pyrogallate.** *Syn.—Helcosol.*—A yellow powder soluble in alkaline secretions. Used as an antiseptic in skin diseases.

16. **Bis. Phenolate.**—A greyish neutral powder, may be used as a substitute for iodoform and as an intestinal antiseptic. *Dose.*—15 grs.

17. **Bis. Sulphocarbolate.**—An intestinal antiseptic. *Dose.*—4 to 8 grs.

18. **Bis. Sodium-phosph-salicylate.** *Syn.—Bismuthol.*—A white powder, may be used like iodoform combined with talc (1 in 5).

19. **Bis. Methylen-digallate.** *Syn.—Bismal.*—May be sprinkled over ulcers and intertrigo and given in tubercular diarrhœa. *Dose.*—10 to 15 grs.

20. **Bis. Subgallate.** *Syn.—Dermatol.*—A yellow, odourless, non-irritating and non-poisonous powder, superior to iodoform as a dressing in ulcers, burns, wounds, chancres, eczema, &c. It may be applied as a paste, powder, collodion, glue or ointment. Found invaluable in tubercular diarrhœa. Has been used also in gastric ulcer and cancer. *Dose.*—30 to 90 grs. daily.

21. **Bis. Resorcinate.**—A yellowish powder, may be used as a substitute for iodoform.

22. **Bis. Iodo-Resorcin-Sulphonate.** *Syn.—Anusol.*—In piles as a suppository.

23. **Eudoxin.**—A *bismuth salt of tetraiodophenolphthalein* (nosophen) in reddish-brown insoluble powder, used in tubercular ulceration of the bowels in 15 grs. doses, and the enteritis of children in 2 to 4 grs. Externally like iodoform.

24. **Erythrol.**—A double iodide of bismuth and cinchonidine. Useful in butyric acid dyspepsia. *Dose.*—$\frac{1}{4}$ to $\frac{3}{4}$ gr.

25. **Bismuth Tannate.**—A yellow powder, insoluble in water. Useful in diarrhœa and dysentery. *Dose.*—10 to 30 grs.

26. **Bis. Tribromophenol.** *Syn.—Xeroform.*—A greenish yellow powder. Powerful intestinal antiseptic, recommended in cholera. Used also as a dusting powder in place of iodoform. *Dose.*—5 to 20 grs.

Pharmacology of Bismuth Salts.

Externally.—Bismuth salts have no action on the unbroken skin, but on the denuded surface they act as a **sedative**, mild **astringent** and **antiseptic.**

Internally. **Gastro-intestinal tract.**—Bismuth salts blacken the tongue, have no taste and produce a feeling of roughness in the mouth. The sparingly soluble salts in large doses and the soluble salts in small doses act as direct **sedatives** to the mucous membrane of the **stomach and intestine.** How they act

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

whether by mechanically shielding the nerve-terminations from the irritating secretions, or by altering the composition of the secretions or by modifying the circulation, is not known. As a consequence of this sedative effect, they act as **antiemetics** and **mild astringents**. They also control fermentation, especially the salicylate, sulphocarbolate, phenolate, &c., and are therefore **intestinal antiseptics**. Bismuth subnitrate splits up into bismuth oxide and nitric acid in water, liberating nitrous fumes which tend to contribute towards the antiseptic property of the drug. In moderate doses bismuth acts in the same manner as small doses of arsenic, 1 dr. of liq. bismuthi being equal to ½m. of liq. arsenicalis. In large doses it produces **gastro-intestinal irritation** like arsenic or antimony though not so powerfully. It passes out with the fæces as a sulphide, colouring them leaden black.

Remote action.—Bismuth salts are slowly absorbed. We know little of their remote action. According to some authorities they are carriers of oxygen like arsenic, especially the oxide. But this is certain, that soluble salts when taken for long periods produce fatty degeneration of the liver in the same way as phosphorus and arsenic. But how far these effects are due to arsenic as an impurity in the drug is not easy to say. Sometimes we observe a purplish line on the gums and an onion-like smell in the breath. The latter is believed to be caused by traces of tellurium—also an impurity in bismuth preparations.

Elimination.—Bismuth is eliminated in the intestinal secretion, urine and milk. A portion is deposited in the liver, spleen, kidneys and nervous system.

THERAPEUTICS OF BISMUTH SALTS.

Externally.—Bismuth is a **cosmetic**, the oxychloride being preferred for this purpose, as it can be reduced to the finest powder. Persons using this cosmetic should avoid sulphuretted hydrogen which acts chemically on the metal and turns the face leaden black. As a *local sedative*, *astringent* and *antiseptic*, bismuth may be applied in the form of powder, lotion or ointment to **chapped hands** and **nipples**, **irritable ulcers**, **intertrigo**, **herpes**, **eczema**, &c. In weeping eczema the writer uses the subnitrate and oxide of zinc in equal parts as a dusting powder after painting the red areola with a silver solution (see p. 251). Bismuth salicylate, dermatol and many non-official derivatives may be used as substitutes for iodoform. Ferrier's snuff wonderfully checks **coryza** and **chronic nasal catarrh**. Bismuth subnirate (60 grs. to water 1 oz suspended by mucilage or glycerin) may be used as an injection in **gonorrhœa** or **leucorrhœa**, and as a pessary (oxychloride 10 grs.) in irritable conditions of the cervix and os.

Internally.—As a *gastric sedative* bismuth salts are remarkably

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

efficacious in all **irritable** and **painful gastric disorders**, such as catarrh, vomiting, indigestion, gastrodynia, pyrosis and ulcers, simple and malignant. The only drawback to their use is that they cause constipation. If the pain is intense they may be combined with morphine, and if the gastric irritability is great with hydrocyanic acid dilute.

As an *intestinal sedative* and *astringent* they are largely employed in all forms of **diarrhœa**, acute or chronic, either in children or adults. The salicylate is a useful remedy for children's diarrhœa due to the decomposition of food, because it has the properties of both bismuth and salicylic acid. Occasionally it may with advantage be combined with grey powder. It has also been found very useful in **summer, tubercular, enteric** and **lienteric diarrhœa** and **cholera**. The bismuth salts are most effective medicines in **mucous diarrhœa**, and **dysentery**. In the last disease they may be given with ipecacuanha in the acute stage or with Dover's powder to check the after diarrhœa.

Prescribing hints.—As the less soluble preparations allay irritation better than the soluble ones, they are to be preferred when gastric or intestinal irritability is a prominent symptom. For this purpose we use either the carbonate or the subnitrate. If they are given in a mixture they should be suspended by the compound tragacanth powder, and not by the mucilage of acacia, as the latter may convert the mixture into a jelly-like mass. Again the subnitrate should not be combined with any alkaline carbonates, for bismuth oxynitrate slowly parts with nitric acid in water and gives off carbonic acid (see p. 81), but this objection does not apply to the carbonate. Neither should they be mixed with iodides (see p. 81). Liq. bismuth. ammon. citratis is more astringent and irritant than the carbonate, subnitrate and oxide, and may be given with acids or alkalis. The Royal College of Physicians in 1892 recommended the following **anticholeraic mixture**:—Bis. et Cerii Salicylas 5 grs., Pulv. Cinnamon. Co. 7½ grs, Tr. Camph. Co. 30 ms., Tr. Chlorof. Co., Sp. Ammon. Arom. *aa* 20 ms., Essen. menth. pip. 10 ms., Mist Cretæ *ad* 1 oz. *Dose.*—1 oz. every 2 to 4 hours.

BORAX. See page 178.

BROMUM.

Bromine. Br. (*Non-official*).

Source and characters.—A liquid non-metallic element obtained from sea-water and saline springs. From it are prepared—

AMMONII BROMIDUM.

Ammonium Bromide. NH_4 Br.

Source.—Formed by neutralising hydrobromic acid with solution of ammonia. $HBr + NH_4HO = NH_4Br + H_2O$.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—In small, colourless crystals; taste pungent.
Solubility.—1 in 1½ of water, 1 in 15 of alcohol (90 p.c.).
Impurities.—Bromates, iodides, nitrates, lead, iron.
Action.—Nervine sedative, hypnotic. **B.P. Dose.**—5 to 30 grs.

POTASSII BROMIDUM.

Potassium Bromide. KBr.

Source.—May be obtained by adding a slight excess of bromine to a strong solution of potassium hydroxide, evaporating the solution of potassium bromide and bromate to dryness, decomposing the bromate by fusing the mixture with charcoal and purifying by crystallisation.

Characters.—In colourless cubical crystals; taste pungent, saline.
Solubility.—1 in 2 of water, 1 in 200 of alcohol (90 p.c.).
Impurities.—Lead, iron, copper, arsenium, aluminium, zinc, calcium, magnesium, sodium, ammonium, bromates, iodates, cyanides, &c.
Identification.—Crystals of potassium bromide resemble those of *potassium iodide* which are larger and more distinctly cubical, but this is not invariably the case. Chemical tests are the safest guide.
Incompatibles.—Solutions containing free chlorine or free acids, spirit of nitrous ether if acid.
Action.—The same as above. **B.P. Dose.**—5 to 30 grs.
Enters into.—The preparation of Acid. Hydrobrom. Dil.

SODII BROMIDUM.

Sodium Bromide. NaBr.

Source.—Prepared in the same manner as potassium bromide.
Characters.—In small white cubic crystals, somewhat deliquescent, inodorous; taste saline. *Solubility.*—1 in less than 2 of water, 1 in 16 of alcohol (90 p.c.). *Impurities.*—The same as of potassium bromide.
Incompatibles.—The same as of potassium bromide.
Action.—Similar to Ammon. Bromide. **B.P. Dose.**—5 to 30 grs.

Non-Official Preparations and Derivatives.

1. **Ethyl Bromide.**—A colourless volatile liquid with a peculiar odour and sweetish warm taste. Used as an anæsthetic, particularly in America.
2. **Lithium Bromide.**—A white granular deliquescent salt containing bromine 91·95 p.c. Useful in Bright's disease. *Dose.*—5 to 15 grs.
3. **Rubidium Bromide.**—In white crystals. *Dose.*—5 to 30 grs.
4. **Rubidium Ammonium Bromide.**—In white granular crystals more powerful than potassium bromide in epilepsy. *Dose.*—90 grs. daily.
5. **Strontium Bromide.**—In deliquescent, acicular crystals. Better borne than potassium bromide. *Dose.*—5 to 30 grs.
6. **Bromalin.** *Syn.—Brom-ethyl-formin.*—Colourless scales soluble in water. A nervine sedative without producing skin eruptions. *Dose.*—10 to 30 grs.
7. **Bromidia.** *Syn.—Liq. Bromo-Chloral Comp. B.P.C.*—1 dr. contains 10 grs. of each of Chloral Hydrate and Pot. Bromide. Chloral Hydrate 1,600 grs., Tr. Cannab. Ind. 400 ms., Tr. Aurant. 400 ms., Suc.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Hyoscyam. 1,600 ms., Syrup 3¾ ozs., Ex. Glycyrrh. Liq. ½ oz. Dissolve and add Pot. Bromide. 1,600 grs. dissolved in 7 ozs. of water. Filter, and add water to 20 ozs. *Dose.*—½ to 2 drs.

8. **Bromoform.**—A colourless, volatile, sweet liquid with an agreeable odour, soluble in chloroform, ether and slightly in water. Most efficacious in whooping cough, diminishing the number, duration, severity and vomiting. *Dose.*—2 to 5 ms. ; ½ to 1 m. for a child 1 year old.

10. **Bromipin.** *Syn.*—*Brominol.*—An yellow oily liquid prepared by mixing bromine with sesame oil (*til oil*). An easily absorbent organic preparation of bromide very useful in epilepsy and neurosis.

Dose.—1 to 4 drs. in emulsion or hydro-alcoholic solution.

11. **Bromo-Hemol.**—A compound of bromine with hæmoglobin in brown powder. Recommended in hysteria of anæmic subjects.

Dose.—15 to 30 grs.

12. **Liq. Arsenici Bromatus.**—See p. 173.

13. **Liq. Auri et Arsenii Bromidi.**—See p. 173.

14. **Magnesii Bromidum.**—A nervine sedative in hysteria and epilepsy. *Dose.*—10 to 20 grs.

15. **Manganesii Bromidum.**—A nervine tonic. *Dose.*—1 to 3 grs.

16. **Calcii Bromidum.**—Given with good results in epilepsy.

Dose.—10 to 20 grs.

17. **Bromal Hydras.**—Large oblique colourless prisms, that melt on the hand. For relieving pain or producing sleep. Not of much value, as it causes pyrosis, vomiting and diarrhœa. *Dose.*—2 to 5 grs.

18. **Bromalbacid.**—A brownish powder containing 6 p.c. of Bromine. Used as a nervine sedative. *Dose.*—15 to 30 grs. per diem.

19. **Bromocoll.**—A Bromine-Tannin-Gelatin compound, in the form of a yellowish powder containing 20 p.c. Bromine 30 p.c. Gelatin. A substitute for the alkaline bromides in epilepsy, insomnia, &c. Passes undecomposed through the stomach and is not absorbed till it reaches the intestines. Should be given in cachets. *Ordinary Dose.*—8 grs. May be increased to 130 grs. in epilepsy.

Pharmacology of the Bromides.

Externally.—Bromine, like chlorine and iodine, destroys enzymes and organised ferments and is therefore a **disinfectant** and **deodorant**. Applied to the skin it acts as an **irritant** and **caustic**. Bromides have no action on the unbroken skin, but on the denuded surface a concentrated solution acts as an **irritant**. The fumes of bromine are so irritating to the respiratory tract that they cannot be inhaled.

Internally. **Alimentary canal.**—Either in concentrated solution applied to the throat or in repeated large doses given by the mouth, bromides **diminish** the **sensibility** and the **reflex excitability** of the fauces. Tickling the pharynx then no longer tends to excite vomiting even though the tactile sensation may remain. The bromides are readily absorbed by the gastro-intestinal mucous membrane, and according to some authorities they are converted into sodium bromide before absorption. They appear to have no influence on the stomach.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Heart and circulation.—Some believe that all bromides are changed into the sodium salt in the blood. But it is certain that they circulate as sodium bromide, and pass through the different organs as such. Bromides, particularly the potassium bromide, act as **direct sedatives to the heart diminishing its force and frequency** by a paralysing influence on the heart substance, and not through the cardio-inhibitory centre. In toxic doses the heart's action is arrested in diastole. It is not yet settled how far bromides can contract the blood-vessels.

Respiration is only slightly depressed, probably through their influence on the circulation.

Temperature is also depressed only by toxic doses, probably by the depressed condition of the circulation.

Nervous system.—The chief action of bromides is on the entire **nervous system** which is **powerfully depressed.** In their progressive action on this system, they follow the "Law of Dissolution" (see p. 158), *i.e.*, the highly-developed functions are affected first, then the lower and lastly the spinal ones.

Cerebrum.—All bromides **lessen the functional activity of the brain.** The sensibility, excitability and emotional activity are all diminished, thereby inducing a state most favourable for sleep. Hence they are **hypnotics** (see p. 159). It is not definitely known whether they act on the nerve-cells or on the circulation. They also depress the **cortical motor area** (see p. 161), and in excessive doses cause degeneration of the cortical cells beginning at the ends of the dendrons.

Medulla and cord.—The great vital centres are more or less depressed. There is considerable **impairment** of the **reflex excitability** induced partly by the paralysed condition of the peripheral sensory nerves but chiefly by the diminished excitability of the nerve-centres.

In brief, bromides depress (1) the cortical motor cells, (2) the medullary and spinal centres, (3) reflex excitability in connection with all the sentient surfaces of the body, (4) the activity of the sensory mechanism, and (5) that of the peripheral nerves.

Muscles.—The bromides not only **impair the activity** of the muscles by their action on the motor cells and reflex centres, but by their direct influence on the muscles themselves. They may be paralysed to such an extent that no convulsions can be produced by poisoning with strychnine. Therefore they are powerful **antispasmodics.**

Metabolism.—Large doses affect metabolic activity by reducing the exhalation of carbonic acid. The amount of urine as well as its colouring and nitrogenous matters and sulphur are increased, while phosphorus is decreased.

Genitals.—Bromides decidedly lessen virility and if continued long the sexual passion. Hence they are **anaphrodisiacs.**

Elimination.—Bromides are soon eliminated chiefly by the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

kidneys, intestinal and bronchial mucous membrane, skin, saliva and milk. Many think that they depress the sensibility of the fauces during their excretion through its mucous membrane.

Acute toxic action.—Acute poisoning is rare. But if ½ to 1 oz. is swallowed, weakness, frontal headache, reduction of pulse-rate, irregular pulse, insensibility, aphasia, amnesia are the chief symptoms. Recovery takes place as a rule unless œdema of the lungs supervenes.

Chronic toxic action or "Bromism."—A group of symptoms following a prolonged use of bromides is known by the name of "bromism." They are an eruption resembling acne which may lead to boils, chiefly on the face and back, mental dulness, anæmia, general prostration, muscular weakness, imperfect articulation, staggering gait, drowsiness and inclination to sleep, lowering of cutaneous sensibility, abolition of reflex action of the pharynx, conjunctivitis, slight increase of bronchial secretion and impairment of sexual powers. The mental faculties may be so much depressed in bad cases, that melancholia, dementia or other mental disorders may follow.

Antidotes.—The mere stoppage of bromides is enough in the early stage, but by administering an extra quantity of common salt (sodium chloride) with food, the ill-effects of the drug may be counteracted.

Physiological antagonists.—Strychnine and atropine.

Therapeutics of Bromides.

Internally **Alimentary canal.**—Before cocaine was known, a solution of potassium bromide was painted several times on the back of the throat before laryngoscopic examination. Bromides are very useful in **reflex vomiting**, such as the vomiting of pregnancy, sea-sickness and vomiting occasioned by nervous disorders. Ringer recommends them in the **spasmodic intestinal colic** of children.

Nervous system.—As a *hypnotic* bromides are very efficacious in **sleeplessness** caused by worry, overwork or mental strain. In **delirium tremens, mania, acute inflammatory or febrile diseases, cerebral congestion, night-screaming** of children, **nightmare** of children and adults, bromides may be used with the greatest benefit either to induce sleep or to allay irritability. As a *soother of excitability* bromides are very effective in many **nervous headaches, irritability of temper** especially of gouty persons, **nervous excitability** of females either during the latter months of pregnancy or the change of life, **hysteria, hypochondriasis**, &c. According to Brunton the recurrence of **morning headache** may in many cases be prevented by giving 20 to 30 grs. of bromide with 10 to 15 grs. of sodium salicylate at night, repeated once or twice next morning, if it is not entirely checked. As a *muscular and spinal depressant*, they are considered very valuable in all forms of **convulsive diseases**, such as **epilepsy, infantile convulsions, puerperal eclampsia, convulsions of Bright's disease** or of **uræmia, hysteria, chorea, tetanus, painful cramp** of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

muscles, &c. In **epilepsy** their efficacy is most marked in *grand mal*, producing little or no effect in *petit mal*. But in order to obtain the full benefit of bromides, they should be continued with occasional interruptions for one to three or more years. Even then we cannot be confident of a permanent cure. Indiscriminate prolonged use sometimes damages the mental faculties.

Bromides are of special value in many convulsive diseases of the respiratory organs, such as **whooping cough, asthma, spasmodic bronchitis, laryngismus stridulus** and **acute laryngitis**. In the last two, they must be given in large doses. In whooping cough the ammonium bromide is considered more efficacious.

Heart.—In some **nervous disorders** of the heart due either to dyspepsia, hysteria or alcoholism, sodium or ammonium bromide is of great use.

Genital organs.—Potassium bromide is a very valuable anaphrodisiac in **nymphomania, satyriasis** and **priapism.** Many cases of **nocturnal emission** yield to it. It checks **menorrhagia** due to ovarian irritation, **ovaritis** and **ovarian neuralgia.**

Glands.—Potassium bromide may be given to reduce **enlarged glands** and **syphilides** in cases where iodides cannot be borne. Sometimes it is employed to reduce enlarged liver and spleen. It is of no use in diabetes.

Potassium bromide may be used to *lessen* the *disagreeable effects* of opium, quinine, salicin and salicylates.

Caution.—Bromides should be avoided in cardiac and nervous weakness, senile softening of the brain, and gastro-intestinal irritation.

Prescribing hints.—Bromides may be administered by the mouth, rectum or hypodermically. By the mouth in the form of lozenge, tablet or mixture. Their taste is fairly well disguised by the liquid extract of liquorice, milk or beer. For an enema they may be dissolved in gruel or mucilage and for a hypodermic injection in water (6 grs. in 1 dr.). Their efficacy is greatly enhanced if potassium sodium and ammonium bromides are given in combination, and the patient is restricted to vegetable food. Of the three salts, sodium and ammonium bromides are not depressant to the heart. To prevent acneform eruptions they may be combined with small doses of arsenic. The hypnotic effect of the bromides may be greatly increased if they are given with chloral hydrate, morphine or hyoscyamus. In some cases of *insomnia* bromidia may be used with great advantage. Children and anæmic persons cannot bear a protracted course of bromide treatment. In *whooping cough* bromoform is sometimes more beneficial than ammonium bromide.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

BUCHU FOLIA.

Buchu Leaves. N.O. *Rutaceæ.*

Syn.—Bucco, Diosma.

Habitat.—Cape of Good Hope.

Source.—The dried leaves of *Barosma betulina.*

Characters.—From ½ to ¾ in. long, dull, yellowish-green, rhomboid ovate, glabrous, somewhat warty, margin denticulate, apex blunt recurved, with visible oil glands. Odor and taste characteristic.

Impurity.—Leaves of *Emplanum serrulatum* which have no glands.

Identification.—Resemble *Senna* and *Uva Ursi* which are entire.

Composition.—(1) A *Volatile Oil* in the glands containing barosma camphor which deposits on exposure. (2) A *Bitter Principle.* (3) *Mucilage.*

Action.—A stimulating diuretic.

Official Preparations.

1. **Infusum Buchu.**—1 in 20. ¼ hour. **B.P. Dose.**—1 to 2 ozs.
2. **Tinctura Buchu.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

Pharmacology.

Internally.—The action of buchu is due to the volatile oil and the bitter principle which it contains. In medicinal doses it causes a sensation of warmth in the stomach, and in large doses nausea and vomiting. The volatile oil is readily absorbed into the blood and is mostly excreted by the kidneys which it stimulates, and partly by the bronchial mucous membrane which is also gently stimulated. Hence, buchu is a stimulating **diuretic** and a mild **expectorant.** During its elimination it soothes and disinfects the urinary passages and imparts a peculiar odor to the urine.

Therapeutics.

Internally.—Buchu is chiefly used to allay the irritability of the urinary tract especially the bladder, and is therefore very serviceable in **cystitis, irritability** of the **bladder, urethritis, gonorrhœa, pyelitis,** &c. Sometimes it is given in **chronic bronchitis.** If continued too long in large doses, it may harm the kidneys. Brunton says that buchu is given in 20 grs. doses in diarrhœa and dysentery in South Africa.

Prescribing hints.—The infusion makes a good vehicle for diuretics, but the tincture contains more oil and therefore does not mix well with water. As its action resembles that of Pareira and Uvæ Ursi it may be combined with them with benefit.

BUTEÆ GUMMI. Butea Gum.

N.O. *Leguminosæ.*

(*Ind. and Col. Addendum.*)

Syn. B.P.—Bengal Kino. **Syn. I.V.**—*Palás Gand*, Beng. Hind.

Habitat.—India, Eastern Colonies.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—Inspissated juice obtained from incisions in the stem of *Butea frondosa*.

Characters.—In small, irregular, shining fragments of a dark ruby colour; inodorous; taste astringent. *Solubility.*—Partially in water. *Impurities.*—Corky and woody particles.

Pharmacology and Therapeutics.

The Bengal kino may be employed in making the official preparations for which the B.P. kino is used in India and Eastern Colonies. Its actions and uses are similar to those of the B. P. kino.

BUTEÆ SEMINA. Butea Seeds.

Source.—The seeds of *Butea frondosa*.

Characters.—Flat, reniform, 1 to 1½ in. long, ¾ to 1 in. wide $\frac{1}{10}$ to $\frac{1}{12}$ in. thick. Testa thin, glossy, wrinkled, reddish-brown. Hilum large, prominent. Odor faint. Taste slightly acrid.

Official Preparation.

1. **Pulvis Buteæ Seminum.**—The kernel dried and powdered, freed from the testa after soaking in water. **B.P. Dose.**—10 to 20 grs.

Pharmacology and Therapeutics.

Externally.—The seeds made into a paste with lime juice act as a **rubefacient** and may be used in ringworm. The leaves as a poultice may be used to disperse boils, pimples, buboes, and hæmorrhoids.

Internally.—The seeds are a powerful **anthelmintic** for **round worm** and may be used as a substitute for santonin, followed as usual by a dose of castor oil.

The flowers yield a fine yellow dye, and the charcoal of the wood is used for bleaching morphine at the Ghazipur factory.

BUTYL-CHLORAL HYDRAS.

Butyl-Chloral Hydrate. $CH_3{\cdot}CHCl{\cdot}CCl_2{\cdot}CH(OH)_2$.

Syn.—Croton-Chloral Hydrate, Trichlorbutylidene Glycol.

Source.—Obtained by the addition of water to the liquid butyl-chloral produced by the action of chlorine gas on aldehyde.

Characters.—In pearly white, trimetric laminæ, having a pungent but not acrid odour and an acrid nauseous taste. *Solubility.*—1 in 50 of water, 1 in 1 of glycerin, and alcohol (90 p. c.), 1 in 20 of olive oil.

Incompatibles.—Alkalis, antipyrin.

Action.—Analgesic. **B.P. Dose.**—5 to 20 grs. *Daily Dose.*—64 grs.

Non-Official Preparations.

1. **Mistura Butyl-Chloral.**—Butyl-Chloral Hydrate 4 grs., Glycerin 15 ms., Chloroform Water to 1 oz.

2. **Pilula Butyl-Chloral. L.H.**—Butyl-Chloral Hydrate 4 grs., Compound Tragacanth Powder 1 gr. Water *q.s.* For 1 pill.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

3. **Syrupus Butyl-Chloral. B.P.C.**—Butyl-Chloral Hydrate 320 grs., Syrup to 1 pint. Dissolve in hot syrup. *Dose.*—1 to 4 drs.

4. **Chloretone.**—Trichlor-Tertiary-Butyl-Alcohol. White-needle-like crystals, with a camphoraceous taste. A hypnotic, local anæsthetic, and antiseptic. Useful in piles and pruritus. *A very valuable remedy for sea-sickness.*

Dose —5 to 24 grs. in capsule or cachet. As a dusting powder, use chloretone 23, zinc oxide 20, and French chalk 90 parts.

PHARMACOLOGY.

The action of butyl-chloral hydrate is very similar to that of chloral hydrate though not so powerful. The difference between the action of these two drugs will be better understood by reference to the following table :—

Butyl-Chloral Hydrate.	Chloral Hydrate.
1. A feeble local anæsthetic	A powerful local irritant and vesicant in a concentrated solution.
2. Less certain, less rapid and a less powerful hypnotic.	More certain, more rapid and a more powerful hypnotic.
3. Less depressant to the heart.	More depressant to the heart.
4. An anæsthetic of the fifth nerve and the regions supplied by it.	*Nil.*
5. Not a general analgesic.	A powerful general analgesic, but inferior to morphine or belladonna.
6. Not so poisonous.	Distinctly poisonous.

THERAPEUTICS.

Externally.—Butyl-Chloral hydrate is sometimes locally applied in combination with menthol to annul the pain of a **carious tooth.**

Internally.—As a *hypnotic* it is seldom used except in **insomnia** with **cardiac weakness,** where chloral hydrate is contra-indicated. Its chief use is in **neuralgia** of the **fifth nerve,** *i.e.*, of the face and a portion of the scalp. According to Ringer it is useful in nearly all neuralgic conditions of the face, occiput, neck and in **migraine.** It has been used with doubtful success in dysmenorrhœa and neuralgia of the limbs.

Prescribing hints.—It is best given in pill which should be made fresh. Syrup of tolu, glycerin and almond mixture fairly cover its taste. In *neuralgia* it is better to give a first dose of 10 grs. and then 5 grs. every two hours until the pain is relieved.

CADINUM OLEUM. Oil of Cade.

N.O. *Coniferæ.*

Syn. B.P.—Juniper Tar Oil, Huile de Cade.
Habitat.—Southern Europe.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—An empyreumatic oily liquid obtained by the destructive distillation of the woody portions of *Juniperus Oxycedrus*, and some other species.

Characters.—A dark-reddish-brown, viscid, oily liquid. Odour empyreumatic. Taste aromatic, bitter, acrid. Sp. gr. 0·990. *Solubility.*—Freely in chloroform and ether, partially in alcohol (90 p.c.) and slightly in water.

Pharmacology and Therapeutics.

Externally.—The oil of cade resembles tar in its action, but has a more pleasant odour. It may be used in **chronic inveterate eczema, psoriasis** and other skin diseases attended with itching. It is given in the shape of an ointment combined with vaseline or simple cerate, or in a liquid form (oil of cade 1, soft soap 5, alcohol 90 p. c. 4.)

CAFFEINA. Caffeine.

$C_5H(CH_3)_3N_4O_2.H_2O$.

Syn. B. P.—Theine. Guaranine.

Habitat.—China, Japan, Upper India, Ceylon.

Source.—An alkaloid obtained from the dried leaves of tea—*Camellia Thea* (N.O. *Ternströmiaceæ*), or the dried seeds of coffee—*Coffea Arabica* (N.O. *Rubiaceæ*).

Tea yields 3 p. c., coffee seeds 1 p. c., guarana 5 p. c., *maté* or Paraguay tea 0.5 p. c., kola nut 3 p. c. Caffeine may be synthetically prepared from xanthine. Chemically it is *tri-methyl-xanthine.*

Characters.—Colourless, silky, acicular, inodorous crystals. *Solubility.*—1 in 80 of cold, and easily in boiling water, alcohol and chloroform. The aqueous solution is neutral.

Incompatibles.—Tannic acid, potassium iodide and mercurial salts.

Action.—Cardiac tonic, diuretic. **B.P. Dose.**—1 to 5 grs.

CAFFEINÆ CITRAS.

Caffeine Citrate. $C_8H_{10}N_4O_2,C_6H_8O_7$.

Source.—An unstable compound prepared from caffeine and citric acid (1 in 1).

Characters.—White, inodorous powder with an acid and slightly bitter taste. *Solubility.*—1 in 32 of water.

Action.—The same as that of caffeine. **B.P. Dose.**—2 to 10 grs.

Official Preparation.

1. **Caffeinæ Citras Effervescens.**—1 in 25.

B.P. Dose.—60 to 120 grs.

Non-Official Preparations and Derivatives of Caffeine.

1. **Caffeinæ Ammonio Citras.**—White crystals slightly soluble in water. *Dose.*—1 to 10 grs.
2. **Caff. Hydrobromid.**—Transparent crystals. *Dose.*—1 to 4 grs.
3. **Caff. Hydrobrom. Efferv. B.P.C.**—*Dose.*—60 to 120 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

4. **Caff. Sodio-Salicylas.**—A white amorphous powder soluble in water, chiefly used for hypodermic injection. *Dose.*—1 to 4 grs.

5. **Caff. Sulphas.**—White crystals soluble in water. *Dose.*—½ to 5grs.

8. **Caff. Valerianas.**—White crystals. In hysteria and pertussis. *Dose.*—½ to 3 grs.

9. **Migranin.** *Syn.—Antipyrin-Caffeino-Citricum.*—Crystals soluble in water. In headache but causes sleeplessness. *Dose.*—8 to 15 grs.

10. **Symphorol.**—Three compounds are sold under this name. They may consist of *caffeine-sulphonic acid* combined with lithium (**symphorol L.**), with natrium (**symphorol N.** Syn.—*Nasrol.*) with strontium (**symphorol S.**). All are white crystals and act as diuretics and are used in cardiac and renal dropsy. *Dose.*—10 to 15 grs.

11. **Ext. Kolæ Liq. B.P.C.**—Prepared from the seeds of *Cola vera* which contain about 2 to 2·5 p.c of Caffeine. *Dose.*—10 to 20 ms.

Pharmacology.

Internally.—Caffeine seems to stimulate, though not in every case, the salivary and gastric glands and dilate the gastro intestinal blood-vessels. Hence, tea and coffee are **digestive adjuvants** under certain conditions. With some, coffee acts **aperient.** In excessive doses they are gastro-intestinal [illegible] causing dyspepsia.

Heart.—Caffeine readily enters the blood and circ[illegible] changed. In medicinal doses it not only **strengthens the** [illegible] **of the contractions** but **increases the systolic period,** and thereby shortens the diastolic one. As a consequence of this, **the arterial tension is heightened** and the pulse becomes fuller and slower; In toxic doses the pulse becomes very frequent irregular and intermittent, and at last the heart stops in systole. These effects are largely due to the direct action of the drug on the cardiac muscle, and partly on the cardio-inhibitory centre.

Blood-vessels.—It first contracts then dilates the arterioles, thereby first raising and afterwards lowering the **blood pressure.** This is caused by its direct action on their muscular coat, and to some extent on the vaso-motor centres.

Respiration.—In medicinal doses respiration is quickened and in large doses depressed from its action on the respiratory and cardiac centres.

Temperature is not affected by small doses, but is increased by large doses.

Nervous system.—In small doses caffeine **stimulates the nerve-centres in the cerebrum, bulb and cord.** Its stimulating effect becomes apparent after a cup of tea or coffee by the removal of fatigue and languor, mental exhilaration and increased capability for work. In large doses it causes restlessness, wakefulness, ringing in the ears, delirium and tremors. The cord and muscles are not affected in man, but in frogs either tetanic spasms or muscular rigidity occurs. The sensory and motor nerves remain unaffected.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Metabolism.—We know little of its action on tissue-change, except that it increases the excretion of xanthine and urea in the urine. These may be derived directly from the caffeine.

Kidneys.—It has been experimentally proved that caffeine first contracts the renal vessels, causing a diminished flow of urine, but this is quickly followed by dilatation of the vessels and diuresis. Caffeine also has a direct stimulating action upon the renal secretory epithelium, but this is not so marked as in the other members of the purin group—theobromine and theophylline (*q.v.*). It is therefore both a **vascular** and a **stimulant diuretic.**

Acute toxic action.—Burning in the throat, thirst, gastro-intestinal pain, violent vomiting and purging, giddiness, tremors in the extremities, free diuresis, clear intellect have been observed in a case of poisoning by 60 grs., of the citrate; recovery taking place under the use of nitro-glycerin.

Chronic toxic action.—A slow development of toxic symptoms from excessive tea-drinking is very rare, but is well illustrated in the case of Mr. P. Phelan admitted into the Bellevue Hospital, New York. Thirty cups per day without food were drunk by him when he got awfully prostrated. Extreme indigestion, extreme anæmia, complete inability to move, great cardiac and respiratory distress were the chief symptoms. Another case of excessive tea drinking came under the notice of Dr. Gordon of the Jefferson Medical College, Philadelphia. She used to drink about 45 glasses (360 ozs.) of tea per day for two years before admission, and suffered mostly from symptoms of posterior and lateral sclerosis of the cord.

THERAPEUTICS.

Externally.—An infusion of tea is often used by the writer as a collyrium in simple conjunctivitis, a gargle for sore-throat, and a wash for irritable sores and ulcers. It may be injected either alone or with alum in otorrhœa and leucorrhœa.

Internally. **Heart.**—As a *cardiac stimulant* it has been found useful in many **cardiac diseases**, such as aortic or mitral obstruction. Its efficacy is greatly enhanced if it is combined with strychnine. As it can neither slow nor make the heart's beats regular, it cannot replace digitalis therapeutically. The writer has seen it tone up the heart and remove the intermittent character of the pulse brought on by large doses of *Apocynum cannabinum*. It is of signal service **in cardiac dropsy** on account of its dual effects on the heart and the kidneys. It may be used to strengthen the heart in many acute diseases, such as **pneumonia, fevers**, &c.

Lungs.—A cup of strong coffee occasionally relieves a fit of **bronchial asthma.** The citrate in 5 grs. doses may be used with the same effect.

Nervous system.—In **migraine** the effervescent citrate or hydrobromide is sometimes useful but it is inferior to antipyrine or phenacetin.

Kidneys.—Caffeine is an uncertain diuretic and has now been superseded by Diuretin, Agurin and Theocin. Whitla speaks

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

favourably of it in **chronic Bright's disease**, as he has found it to reduce both albumen and anasarca. Many patients get habituated to its use, and its diuretic action is entirely lost on them after a week or so. On account of its stimulating action upon the kidney cells caffeine must *never be given* in cases of *acute nephritis*.

Antidote to poisons.—In opium or morphine poisoning tea or coffee has always been used with benefit.

Prescribing hints.—Caffeine is usually given in an effervescing form, but it may equally well be combined with other drugs, such as strychnine or digitalis in a mixture, as they mutually help each other, or it may be exhibited alternately with digitalis. The writer always prescribes it with phenazone or phenacetin in cachets in *migraine*. Caffeinæ sodio-salicylas may be used hypodermically, or be extemporaneously prepared by dissolving caffeine 20 grs. and sodium salicylate 17½ grs. in distilled water 1 dr. (3 ms. = 1 gr.). Caffeine sometime causes so much insomnia that its use has to be discontinued.

CAJUPUTI OLEUM.

Oil of Cajuput. N. O. *Myrtaceæ*.

Syn. I. V.—*Kayaputir tel*, Beng. *Kayaputi ke tel.* Hind. Bom.

Habitat.—Imported from Singapore and Batavia.

Source.—Distilled from the leaves of *Melaleuca leucodendron*.

Characters.—Bluish-green; odour penetrating, agreeable, camphoraceous; taste aromatic, bitterish, camphoraceous. Sp. gr. 0·922 to 0·930. Colourless when rectified. *Solubility.*—In alcohol (90 p. c.).

Impurities.—Other oils, copper and camphor.

Identification.—Its colour and smell help recognition.

Composition.—(1) *Cajuputine Hydrate* or cajuputol, isomeric with Borneo camphor, 75 p. c. (2) *Cineol*, a second oil. (3) *Cajuputein.*

Action.—Rubefacient, stimulant, antispasmodic.

B. P. Dose.—½ to 3 ms.

Enters into.—Lin. Crotonis, and the

Official Preparation.

1. **Spiritus Cajuputi.**—1 in 10. **B.P. Dose.**—5 to 20 ms.

Pharmacology and Therapeutics.

Externally.—It is a **stimulant** and **rubefacient** to the skin, and is therefore rubbed in as a gentle counter-irritant on the chest in **bronchitis, pneumonia, pleurodynia, pleuritis**, &c.; and over **painful** and chronically **inflamed joints**. It may be mixed with mustard oil or other stimulating and anodyne liniments. It has been applied with success in **eczema, psoriasis** and **acne rosacea**. As a **parasiticide** it may be employed in **tinea tonsurans**.

Internally.—It is a powerful **diffusible stimulant, carminative** and **antispasmodic**, and to some extent **narcotic**.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

As a stimulant it has been found useful in many **asthenic fevers, bronchitis or broncho-pneumonia**. According to Whitla its stimulating action is almost equal to that of musk. It is an excellent remedy for **flatulent colic** or **intestinal spasm**, sometimes relieving the pain by a single dose of 20 ms. of the alcoholic solution. It has been recommended in **hysteria, neuralgia** and **chronic rheumatism.**

Prescribing hints.—It may be given on sugar, in sherry or in the form of an emulsion or pill.

CALCII CARBONAS PRÆCIPITATUS.

Precipitated Calcium Carbonate. $CaCO_3$.

Syn. B.P.—Precipitated chalk. **Syn. I.V.**—*Khari*, Beng.

Source.—Obtained by the interaction of calcium chloride and sodium carbonate; $CaCl_2 + Na_2CO_3 = CaCO_3 + 2NaCl$.

Characters.—A whitish micro-crystalline powder insoluble in water.

Impurities.—Phosphates, sulphates, iron and alumina.

Incompatibles.—Acids and sulphates.

Action.—Desiccant, antacid, slightly astringent.

B.P. Dose.—10 to 60 grs.

Enters into.—Troch. Bismuth. Co. and Syr. Calc. Lactophosph.

CRETA PRÆPARATA.

Prepared Chalk. $CaCO_3$.

Source.—Native calcium carbonate purified by elutriation.

Characters.—White friable masses or white powder.

Impurities.—Iron, aluminium, magnesium, phosphates, sulphates, silica.

Incompatibles.—Acids and sulphates.

Action.—The same as above. **B.P. Dose.**—10 to 60 grs.

Enters into.—Hyd. c. Creta and the

Official Preparations.

1. **Mistura Cretæ.** *Syn.*—*Chalk Mixture.*—The powders may be kept mixed in dry condition; 40 grs. to 1 oz. of cinnamon water when required. **B.P. Dose.**—½ to 1 oz.; 1 to 2 drs. for a child 1 year old.
2. **Pulvis Cretæ Aromat.**—1 in 4½. **B.P. Dose.**—10 to 60 grs.
3. **Pulv. Cretæ Aromat. c. Opio.**—1 of opium in 40.
   B.P. Dose.—10 to 40 grs.; 1 gr. for a child 1 year old.

Non-Official Preparations.

1. **Cholera and Diarrhœa Mixture** (Board of Health's prescription.)—Pulv. Cretæ Arom. B.P. 1864 3 drs., Sp. Ammon. Arom. 3 drs., Tr. Catechu 10 drs., Tr. Card. Co. 6 drs., Tr. Opii 1 dr., Mist. Cretæ to 20 ozs. Mix. *Dose.*—1 oz. for an adult after each liquid motion.
2. **Tooth Powder.**—Borax 4, Precipitated Chalk 8, Powdered Myrrh 2, Powdered Iridis 2, Powdered Cinnamon 2. Mix well and sift.

Pharmacology.

Externally.—Chalk is a mild **astringent** and **desiccant.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Internally. **Alimentary canal.**—It acts as a direct local **antacid**, neutralising free acids in the mouth and stomach. If not already acted upon, it passes readily into the intestine, where in acts as an **antacid** and a non-irritating **astringent**, caused by (1) the neutralisation of any acid it meets with forming a chloride or lactate, and thus reducing the secretion, by (2) its mechanical action, and by (3) some obscure sedative effect on the mucous membrane. Lime salts are feebly absorbed on account of their low diffusive power and are excreted with the fæces.

Kidneys.—Some think that calcium carbonate is a **diuretic**, because certain mineral waters, such as Contrexeville and Vittel containing calcium bicarbonate and sulphate among other salts, have been found useful solvents for **uric acid**. But there is no direct evidence.

THERAPEUTICS.

Externally.—Chalk may be used as a dusting powder in **excoriations, burns** and **weeping eczema**. Duckworth uses it in the form of an ointment (1 in 1 of benzoated lard) in **erysipelas**.

Internally. **Alimentary tract.**—It is used as a basis for almost all the tooth powders (see p. 121). As an *antacid* it may be used in **acid dyspepsia**, but lime water acts much better. It is an excellent remedy for mild **diarrhœa**, especially that of children with sour smelling stools. If the diarrhœa is caused by some irritating food, a dose of castor oil should precede its use. Lime salts are of special value in **acid poisoning**, especially in oxalic acid poisoning, as they form insoluble oxalates.

Nutrition.—Calcium carbonate is a useful remedy in deficient nutrition. Its good effects are well seen in children suffering from **rickets** and **mal nutrition**, when given in very small doses. (See Calcium Phosphate).

Kidneys.—It is never used as a diuretic, though Contrexéville and Vittel waters may be given largely before meals as solvents of **uric acid calculi**

Prescribing hints.—Generally given in the form of chalk mixture with opium and astringent tinctures. Aromatic chalk powder with bismuth and grey powder is very useful in *infantile diarrhœa*.

CALCII CHLORIDUM.

Calcium chloride. $CaCl_2, 2H_2O$.

Source.—Formed by neutralising hydrochloric acid with calcium carbonate and desiccating below 392°F. $CaCO_3 + 2HCl + H_2O = CaCl_2 2H_2O + CO_2$.

Characters.—In dry, white, deliquescent masses. *Solubility.*—1 in 1 of water, 1 in 3 of alcohol (90 p.c.). *Impurities.*—Iron, aluminium, magnesium and carbonates.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Dispensing hints.—As the salt is very deliquescent it should be preserved in hermetically sealed bottles, or in solution with the strength marked. Crystalline calcium chloride cannot be easily weighed.

Action.—Alterative, deobstruent, hæmostatic. **B.P. Dose.**—5 to 15 grs.

Pharmacology and Therapeutics.

Externally.—Calcium chloride is rarely used, though its lotion has been found occasionally to relieve **pruritus.**

Internally.—It is an excellent **alterative,** slowing and strengthening the pulse, and was largely employed in former years in **scrofula** with glandular enlargements of the neck, **rickets, tuberculosis** and **chronic diarrhœa** with impaired digestion. It is seldom used now in these cases. Its most important action is that it **increases the coagulability of the blood** more powerfully than any other lime salts; hence it is most valuable in **internal hæmorrhages,** either from the lungs, gastro-intestinal tract or other organs The writer uses it in 10 to 15 gr. doses in preference to ergot in **hæmoptysis, hæmatemesis, intestinal** and **hæmorrhoidal bleeding,** and **menorrhagia,** and finds it always effective. It is the only remedy which can arrest and prevent bleeding in **hæmophilia.** As the increased coagulability of the blood does not continue for any length of time notwithstanding continued administration, it is not so effective in **aneurism,** although cases are recorded in which great improvement followed from its use in 15 to 30 gr. doses. Many speak highly of it in **lobar pneumonia** in 5 to 15 gr. doses every 4 hours. It is very useful in certain cutaneous eruptions associated with diminished coagulability of the blood, especially **urticaria** and **erythema nodosum.**

Prescribing hints.—It may be given safely up to 30 grs. three times a day, but these large doses must not be continued for more than a few days at a time. It is best given in solution after food. In *hæmophilia* 60 gr. doses have been given without bad results. But as all lime salts are feebly absorbed, we are doubtful as to the wisdom of giving it in excessive doses as it is apt to derange the stomach.

CALX.

Lime. CaO. (*Unslaked lime.*)

Syn. I. V.—*Chun,* Beng. *Chunám,* Hind.

Source.—Obtained by calcining chalk, lime stone or marble.

Characters.—In compact whitish masses which swell and fall to powder by absorbing water.

Action.—Caustic. Not used internally.

CALCII HYDRAS.

Calcium Hydroxide. $Ca(HO)_2$.

Syn. B.P.—Slaked lime. **Syn. I. V.**—*Chun,* Beng. *Chunám,* Hind.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—Freshly prepared by the interaction of water and calcium oxide.

Characters.—A white alkaline powder. *Solubility.*—1 in 900 of water, and 1 in 60 if sugar is added. *Impurities.*—Iron, aluminium, silica, alkalis and their salts.

Incompatibles.—Vegetable and mineral acids, alkaline and metallic salts, tartar emetic.

Enters into.—The preparation of Calc. Hypophosph., Chloroform, Ext. Ipecac. Liq. and the

Official Preparations.

1. **Linimentum Calcis.**—1 in 2. A substitute for **Carron oil** which is made of lime water and linseed-oil. A sedative application to burns and scalds.

2. **Liquor Calcis.** *Syn.—Lime Water.*—½ gr. in 1 oz. It should be kept in green bottles well corked. *Enters into.*—The preparation of Argent. Oxid., Lin. Calcis, Lotio Hydrarg. Flav. and Lotio Hydrarg. Nigra. **B. P. Dose.**—1 to 4 ozs. ; ½ to 1 dr. for a child 1 year old.

3. **Liquor Calcis Saccharatus.**—8 grs. in 1 oz. Should be mixed with the solution of sugar in distilled water.
B.P. Dose.—20 to 60 ms.

Pharmacology.

Externally.—Unslaked or slaked lime is a **caustic**, but its action is localised. Limewater is a local **sedative** and **astringent** when applied to the broken skin.

Internally. **Alimentary canal.**—Like chalk, lime neutralises free acids of the contents of the stomach and acts as an **antacid**, but more powerfully, and thus controls the curdling of milk. It has a slight **sedative** property. In the intestine it acts as an **astringent** like chalk, but in a less degree. It is an **antidote** for poisoning by mineral acids, oxalic acid and zinc chloride. An injection of lime water kills thread worm.

Heart and circulation.—Only a minute quantity enters the blood and is found in the plasma as a phosphate. It has been experimentally proved that a full physiological quantity of lime circulating in the blood promotes a complete contraction of the heart, while a deficient supply weakens it. It also increases the coagulability of the blood and thus acts as a remote **hæmostatic**, but not so powerfully as the calcium chloride.

Kidneys.—The greater portion is excreted by the fæces, only a small quantity passes through the kidneys, rendering the **urine alkaline.**

Therapeutics.

Externally.—As a *caustic* in the form of Vienna Paste (slaked lime 6, caustic potash 5, alcohol 90 p.c. *q.s.*), slaked lime may be used to destroy **warts** and small **epithelial** and other **growths.** Lime water either with linseed oil (Carron Oil), olive

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

oil or glycerin is a soothing application to **burns, scalds** and **cracked nipples**. An addition of 1 to 2 p.c. of carbolic acid increases its efficacy. It makes a soothing astringent dressing for weeping **eczema**, and may be used as an injection to lessen the discharges in **leucorrhœa, gonorrhœa, gleet, otorrhœa**, &c., even when inflammation is present. It may be injected into the rectum in **thread worm**.

Internally. **Alimentary tract.**—Lime water makes a good mouth-wash for **ulcerative stomatitis**. It is said to dissolve false membranes of **croup** and **diphtheria**. It may either be used as a spray or applied with a brush or swab. It is chiefly used to prevent the **curdling of milk** (1 in 3 or more) and check **vomiting**. In **acid dyspepsia, gastrodynia** and **cancer** of the stomach, it must be freely employed with milk (1 in 1) to prevent regurgitation. In the same way it may be given in **enteric diarrhœa** and other affections to prevent the milk from forming hard indigestible lumps. As an astringent it is useful in **mild infantile diarrhœa**.

Prescribing hints.—Lime water is ordinarily given in milk. If the additional bulk be an objection to its use, saccharated lime water may be substituted. To suckling babies one tea-spoonful with an equal quantity of milk may be given every 3 hours before nursing, and to hand-fed ones a dessert spoonful in each bottle.

CALCII HYPOPHOSPHIS. See Phosphorus.

CALCII PHOSPHAS.

Calcium Phosphate. $Ca_3(PO_4)_2$.

Source.—Obtained by (1) dissolving bone-ash in dilute hydrochloric acid, adding the liquid to dilute solution of ammonia, and washing and drying the precipitate, or (2) by the interaction of calcium chloride and sodium phosphate.

Characters.—A light white amorphous powder. *Solubility.*—Insoluble in water, soluble in dilute hydrochloric acid and nitric acid. *Impurities.*—Lead, copper, arsenium, iron, aluminium, magnesium, silica, carbonates and calcium oxalate.

Action.—Alterative, tonic. **B.P. Dose.**—5 to 15 grs.

Enters into.—The preparation of Ext. Euonymi Sicc. and Pulv. Antimonialis.

Official Preparation.

1. **Syr. Calcii Lactophosphatis.**—See p. 193.

Non-Official Preparations.

1. **Calcii Glycero-Phosph.**—A white crystalline powder soluble in water. A most effective soluble salt. A valuable nervine tonic and alterative. *Dose.*—3 to 10 grs.
2. **Syr. Ferri Phosph. Comp. B.P.C.** See **Ferri Phosph.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY.

Internally.—Calcium phosphate forms the basis of new tissues and is found in excess where cell-growth is active whether normal or pathological. It has been experimentally observed that the withdrawal of lime salts from the food of animals renders their bones soft and spongy, and that fractures unite more speedily when calcium phosphate is administered to them. Hence it is an essential article of food for the nutrition and growth of nitrogenous, fatty and bony tissues. In the stomach it is acted upon by free acids and forms a soluble superphosphate, in which form it is absorbed in very small quantities, and the rest passes into the intestine unchanged. If given in excess it deranges digestion, and if continued long may form concretions in the intestine.

THERAPEUTICS.

Internally.—As a *promoter* of nutrition and cell-growth, calcium phosphate is exceedingly useful in the case of **children** who have overgrown their strength; women weakened by child-bearing, prolonged suckling, or excessive menstruation; **anæmia**; and **exhaustion** brought on by **prolonged suppuration, diarrhœa, leucorrhœa, chronic bronchitis, phthisis**; &c. It may also be given to expedite the union of **fractures** and the healing of **caries of bones**. Beneke considers it most efficacious in those diseases in which the phosphates are passed in excess with the urine, *e.g.*, hectic. It is an excellent remedy for those whose health has suffered from long residence in town or from overwork. It acts remarkably well in **rickets** by rectifying the faulty nutrition and inducing a more healthy growth. But it should not be commenced until the pains and tenderness of bones have subsided. It is also recommended in **adenitis** and **mollities ossium**.

Prescribing hints.—It is useless to give this or other lime salts in large doses as they are not freely absorbed. Either the Syrup Calcis Lactophosphatis, or the powdered phosphate in 1 or 2 gr. doses several times a day, after food, may be given with advantage. Iron or other lime salts when combined with it, as in Parrish's Chemical Food, enhance its efficacy. Calcium Phosphate may be usefully added to Normal Saline Solution in a case where transfusion is necessary.

CALX CHLORINATA. See Chlorum.

CALX SULPHURATA.

Sulphurated Lime.

Syn.—Calcium Sulphide, Canton's Phosphorus.

Source.—A mixture containing not much less than 50 p.c. of calcium sulphide, CaS, with calcium sulphate and carbon.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

May be prepared by heating a mixture of native calcium sulphide and carbon.

Characters.—A greyish-white powder with a smell of hydrogen sulphide.

Action.—Antisuppurative. **B.P. Dose.**—$\frac{1}{4}$ to 1 gr.
Max. Dose.—8 grs.

NON-OFFICIAL PREPARATION.

1. **Lotio Calcii Sulphurati. U.C.H.**—Slaked lime 4, Sublimed Sulphur 4, Distilled water 35. Boil, evaporate and filter to 20. May cure itch in half an hour when applied after a warm bath. It resembles **Vleminckx's Solution** (*Q. V.*).

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Its chief property is to hasten the maturation, and to prevent the formation, of boils. It has also been found useful in carbuncles, acne, suppurating glands in the neck, periostitis, alveolar abscess, and inflammatory processes induced by influenza.

Prescribing hints.—It is best given in pills (see p. 87.) The pills can be obtained ready-made containing each $\frac{1}{12}$, $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 gr.

ADDITIONAL NON-OFFICIAL DERIVATIVES OF CALCIUM.

1. **Calcium Iodate.** *Syn.*—*Calcinol.*—A substitute for iodoform and a gastro-intestinal antiseptic. *Dose.*—3 to 4 grs.

2. **Calc. Carbide.**—In blackish crystalline masses, evolving acetylene gas when moistened with water. Said to check bleeding, fetor and discharge when applied to inoperable dried ulcerated uterine cancer with a tampon over it.

3. **Calc. Peroxide** *Syn.*—*Gorit.*—Explodes when moistened with glycerin or formalin. In acid dyspepsia of infants. *Dose.*—3 to 9 grs.

4. **Calc. Borate.**—An antiseptic. Useful in gangrenous ulcers, wounds and diarrhœa. *Dose.*—10 to 15 grs.

CALOTROPIS. Calotropis.

N.O. *Asclepiadeæ.* (*Ind. and Col. Addendum.*)

Syn. B.P.—Mudar. **Syn. I.V.**—*Akand shikarer chhál*, Beng. *Mádár* Hind. *Setharka*, Sans.

Habitat.—India, Eastern Colonies.

Source.—The dried root-bark of *Calotropis procera* and of *Calotropis gigantea* (*Seth Akand*) free from outer corky layer.

It should be gathered in April and May from plants grown in sandy soils and dried without the sun before peeling off the bark.

Characters.—In short quilled pieces, $\frac{1}{10}$ to $\frac{1}{8}$ in. thick, $1\frac{1}{2}$ in. wide, covered with soft, greyish, strongly furrowed periderm. This *layer should be removed before powdering.* Odour faint. Taste mucilaginous, bitter, acid.

Composition.—(1) *An active principle* $C_{17}H_{28}O$.

B.P. Dose.—3 to 10 grs. as a tonic; 30 to 60 grs. as an emetic.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparation.

1. **Tinctura Calotropis.**—Calotropis 2 ozs., Alcohol (60 p. c.) *q.s.* By percolation to 1 pint. **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

Externally.—The fresh leaves are considered **anodyne** and are usefully applied warmed to painful joints and subacute inflammatory swellings. The fresh juice is a **rubefacient** and **caustic.**

Internally.—In small doses 3 to 10 grs., three or four times a day, the root-bark acts as an **alterative, tonic** and **expectorant,** but if given every half hour it is a powerful **nauseant, diaphoretic** and gastro-intestinal **irritant.** In 30 to 60 grs. it acts as an **emetic,** causing much nausea.

As an alterative it has been found useful in **chronic rheumatism, secondary syphilis** and **incipient leprosy.** The writer has seen good result from its use in a case of incipient leprosy. Its powder has been found successful in **mucous diarrhœa** and **dysentery** and is considered to be a good substitute for ipecacuanha in these diseases. A decoction of the root-bark (1 to 2 ozs.) or a fluid extract of the leaves (1 to 5 ms) is said to arrest **ague.** The flowers are used in **asthma** and **bronchitis.**

CALUMBÆ RADIX.

Calumba Root. N.O. *Menispermaceæ.*

Habitat.—Eastern Africa, between Ibo and the Zambesi.

Source.—The dried transversely cut slices of the root of *Jateorhiza Calumba*

Characters.—In flattish, circular or oval, centrally depressed pieces; 1 to 2 in. in diameter, ⅛ to ½ in. in thickness; yellowish. Cork brownish, wrinkled; cortex thick with radiating lines.

Identification.—It is easily recognised by the *concave depression* on each side, the dark line running near the edge, the radiating lines of the cork and the characteristic yellowish colouring which becomes more prominent when moistened.

Composition.—(1) *Calumbin,* a whitish crystalline neutral bitter principle. (2) *Berberine,* an alkaloid imparting the yellow colour. (3) *Calumbic Acid.* (4) *Starch.* (5) *Mucilage.* No tannic acid.

Action.—Stomachic tonic.

Official Preparations.

1. **Infusum Calumbæ.**—1 in 20 (¼ hour). Infuse in cold water so as to avoid dissolving starch to a great extent. It decomposes in hot weather. **B.P. Dose.**—½ to 1 oz.
2. **Liquor Calumbæ Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.
3. **Tinctura Calumbæ.**—1 in 10. Brownish. **B.P. Dose.**—½ to 1 dr.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY.

Externally.—Calumba may be taken as a prototype of pure vegetable bitters. It is a mild **antiseptic** and **germicide.**

Internally. **Mouth.**—It is a pure **bitter.** It stimulates the nerves of taste and reflexly the **salivary** and **gastric secretions.**

Stomach.—On reaching the stomach it further stimulates the gastric circulation by its direct action on the local nerves, and thereby increases the flow of the gastric juice. Moreover, the gastric mucous membrane is to some extent stimulated by the saliva reaching the stomach as well as by the reflex stimulation through the peripheral nerves of the tongue and mouth. As a consequence of these actions, appetite is sharpened and digestion is improved, as well as assimilation. It is therefore a **stomachic tonic** and **appetiser.** The efficacy of pure bitters may be increased by combining them with aromatics, or alcohols. Large doses produce opposite effects, *i.e.*, diminish the secretions. If continued for long they derange digestion by producing gastric catarrh.

Intestine.—Calumba increases the peristalsis to a slighter extent than do aromatic bitters. To a certain extent it moderates decomposition. It is therefore a mild **carminative** and **antiseptic.** All pure bitters, especially quassia, are **anthelmintics.**

Blood.—Most of the bitters, like the volatile oils, increase the migration of leucocytes into the blood from intestinal glands.

THERAPEUTICS.

Internally.—As a most useful *stomachic tonic* it is almost daily used to promote digestion in cases where the stomach participates in the **general infeeblement** of functional activity caused by various diseases, overwork or starvation. It is especially valuable during the period of convalescence from acute diseases. It is contra-indicated in all diseases of the stomach that are accompanied by pain, vomiting, inflammation or ulceration such as gastritis, gastrodynia, gastric ulcer, gastric cancer. The infusion (½ pint) may be injected into the rectum for the cure of **thread worm.**

Prescribing hints.—Bitters should not be given in a concentrated form or for a long period without interruption. Calumba is the least irritant of them all and being free from tannin can be given with iron. If there is a tendency to biliousness it is best given with diluted nitro-hydrochloric acid, or if there be any irritability of the stomach, with alkalis and bismuth salts. It is better to give it 20 to 30 minutes before meals. As the infusion decomposes in hot weather the tincture may be used in its stead: 1 dr. being equal to 1 oz. of the infusion.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

CAMBOGIA. Gamboge.

N.O. *Guttiferæ.*

Habitat.—Siam.

Source.—A gum-resin obtained from *Garcinia Hanburii.*

Characters.—In cylindrical solid or hollow rolls, longitudinally striated, or agglutinated masses breaking with a conchoidal fracture. Fractured surface smooth, reddish-yellow. Powder bright yellow. No odour. Taste acrid. *Solubility.*—Completely by the successive action of alcohol (90 p.c.) and water. *Impurities.*—Starch, mineral matters and woody fibres,

Composition.—(1) A brilliant yellow *Resin—Cambogic Acid,* the active ingredient 75 p.c. (2) *Gum,* 15 to 20 p.c.

Action.—Hydragogue purgative. **B.P. Dose.**—½ to 2 grs.

Official Preparation.

1. **Pilula Cambogiæ Composita.**—1 in 6 nearly. **B.P. Dose.**—4 to 8 grs.

CAMBOGIA INDICA. Indian Gamboge.

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern Colonies.

Source.—Gum-resin obtained from *Garcinia Morella.*

Characters.—It must have all the important characters and must respond to the tests of the B.P. Gamboge. *Impurities.*—Particles of wood, leaves and similar extraneous matters. **B.P. Dose.**—½ to 2 grs.

Pharmacology.

Internally. **Gastro-intestinal tract.**—In medicinal doses, it acts as a **hydragogue purgative,** due to increased glandular secretion and peristalsis. In large doses it is an **irritant,** producing vomiting and purging with considerable griping. In toxic doses it causes gastro-enteritis and death. Its action is most marked on the small intestine.

Liver.—No action on the liver, though the presence of bile and fat is necessary for its absorption.

Kidneys.—The resin is absorbed to a small extent and eliminated by the kidneys, rendering the **urine yellow,** and causing slight **diuresis.**

Therapeutics.

Internally.—It is rarely prescribed except in **dropsy, obstinate constipation,** and **cerebral congestion.** It should not be given to children, old people or in inflamed conditions of the abdominal or pelvic viscera.

CAMPHORA. Camphor.

$C_{10}H_{16}O$. N.O. *Laurineæ.*

Syn. I.V.—*Karpur,* Beng. *Kâfur, kapur,* Hind.

Habitat.—China (Formosa), Japan, East Indies.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—Obtained from *Cinnamomum Camphora*, purified by sublimation.

Chips of wood are distilled and the distilled product deposits crystals of camphor on cooling.

There are three varieties, *viz.*, (1) *Formosa camphor*, (2) *Borneo or Barus camphor*, known in India as *Bhimsaini kapur* and (3) *Blumea or Ngai camphor*. The second variety is highly prized by the natives and is sold at a very high price. It is naturally formed in the stems of *Dryobalanops Camphora*, grown in Dutch Sumatra, and sinks in water.

Characters.—In solid, colourless, transparent, crystalline pieces of tough consistence; also in rectangular tablets or pulverulent masses—"Flowers of Camphor," Sp. gr. 0·995. Odour penetrating. Taste bitter, pungent, followed by a sensation of cold. Burns and volatilises. *Solubility.*—1 in 700 of water, 1 in 1 of alcohol (90 p.c.), 4 in 1 of chloroform, 1 in 4 of olive oil, 1 in 1½ of oil of turpentine. It forms a liquid when triturated with chloral hydrate, menthol, phenol or thymol.

Action.—Stimulant, antispasmodic. **B.P. Dose.**—2 to 5 grs.

Enters into.—Lint. Aconiti, Lint. Bellad., Lint. Opii, Lint. Sapon., Lint. Sinapis, Lint. Tereb., Ung. Hyd. Co. and the

OFFICIAL PREPARATIONS.

1. **Aqua Camphoræ.**—About ½ gr. in 1 oz. *Dose.*—1 to 2 ozs.

2. **Linimentum Camphoræ.** *Syn. B.P.—Camphorated Oil.*—1 in 5 nearly. A yellow oily liquid. *Enters into.*—Lint. Chlorof., Lint. Hydrarg., Lint. Tereb. Acet.

3. **Linimentum Camphoræ Ammoniatum.** *Syn. B P.—Lint. Camph. Co.*—1 in 8. Faintly yellowish. Rubefacient and counter-irritant.

4. **Spiritus Camphoræ.** *Syn.—Tr. Camphoræ.*—1 in 10. **B.P. Dose.**—5 to 20 ms. on sugar or in emulsion.

5. **Tinct. Camphoræ Comp.** *Syn. B.P.—Paregoric, Paregoric Elixir.*—¼ gr. of opium in 1 dr. Sherry coloured. Expectorant, narcotic. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATIONS AND DERIVATIVES.

1. **Acidum Camphoricum.**—A white crystalline powder slightly soluble in water. In phthisical night-sweats and vesical catarrh. *Dose.*—10 to 30 grs. in cachets.

2. **Camphor Ball.**—Camphor 2, White Beeswax 5, Spermaceti 3, Almond Oil 3, Tr. of Tolu ½. Melt and pour in ½ oz. gallipots. Applied to chapped skin.

3. **Spirit Camph. Fort.** *Syn.—Rubini's Essence.*—Flowers of Camphor 1, Absolute Alcohol 1, (by weight), or a saturated solution in alcohol (90 p.c.). *Dose.*—2 to 5 drops every 15 minutes in choleraic diarrhœa.

4. **Oxycamphor.**—A white crystalline powder soluble 1 in 5 of water. In dyspepsia. *Dose.*—7 to 15 grs.

5. **Camphor Monobromata.**—In colourless prisms, insoluble in water. A hypnotic and nervous sedative in hysteria, chorea, delirium tremens and petit mal. *Dose.*—2 to 10 grs. in pill with ½ of its weight of curd soap and proof spirit.

6. **Chloral, Menthol, Phenol, Thymol, and Resorcin Camphors.**—1 in 1. Triturate and heat if necessary. Very useful local anodynes.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

7. **Camphoid.**—A solution, 1 in 40, of pyroxylin in equal parts of camphor and absolute alcohol. Useful as a vehicle for the application of iodoform, resorcin, chrysarobin, ichthyol, &c. Forms an opaque film which will not wash off.

PHARMACOLOGY.

Externally.—Camphor being a stearoptene, acts like volatile oils. It is a feeble **antiseptic** and a direct local **vascular stimulant**, exciting redness and heat, and is therefore a mild **rubefacient**. It first stimulates then depresses the local nerves causing slight **anæsthesia.**

Internally. **Alimentary tract.**—It has a peculiar bitter taste and produces a sensation of coldness soon followed by that of warmth in the mouth. It stimulates the local circulation and the secretion of saliva and mucus in the mouth. In the stomach it (1) causes a sense of warmth, (2) dilates the blood-vessels, (3) increases the flow of gastric juice and (4) stimulates the peristaltic movements. It is therefore a **gastric stimulant** and **carminative.** It is also a feeble **antiseptic** and a **reflex excitant** of the heart and the cerebro-spinal centres. In the intestine it acts in the same way.

Heart and circulation.—It enters the blood unchanged from the skin and the mucous membrane, and increases the number of leucocytes, apparently from stimulation of the circulation in the splanchnic area. The heart is stimulated both directly and reflexly rendering the pulse fuller and stronger without much affecting the number of beats. Large doses weaken and quicken the pulse.

Respiration.—It slightly stimulates the respiration and the bronchial secretion by increasing the vascularity of the bronchial mucous membrane. It is therefore a feeble **expectorant.**

Nervous system.—Its chief action is on the nervous system, but it is a capricious drug. With some it acts as an **exhilarant**, causing agreeable hallucinations with a desire to laugh or dance, and with others as an **intoxicant** or **depressant.** It first stimulates then depresses the **reflex movements** and is therefore an **antispasmodic.**

Skin.—It is excreted with the sweat, which it increases by directly affecting the sweat-centres and locally the sweat-glands.

Metabolism.—We do not know much of its action on tissue-change, except that it reduces the temperature both in health and fever, and that it is excreted in the urine as (1) campho-glycuronic acid and as (2) an amido-derivative. These bodies are formed in the system, the former being a compound of camphorol (one atom of H in camphor is replaced by OH) and glycuronic acid.

Genital organs.—In moderate doses it is said to act as an **aphrodisiac** and in large doses as an **anaphrodisiac.**

Elimination.—It is excreted almost unchanged, by the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

bronchial mucous membrane by the skin and kidneys as complex products, and by the fæces.

Acute toxic action.—Poisoning by camphor is rare. The writer has seen only one case of poisoning. Epigastric pain, nausea, sometimes vomiting, giddiness, dimness of sight, delirium verging to mania, epileptiform convulsions, cyanosis, paralysis, cold clammy perspiration, strangury or arrest of urinary secretion, coma and death.

Antidotes.—Emetics, pump, brisk saline cathartics, cold and hot douches, counter-irritation, sometimes stimulants, and strychnine hypodermically if necessary.

Chronic toxic action.—Young women sometimes make a habit of eating camphor regularly with a view to improve their complexion. This habit if once contracted is very difficult to shake off. Mild form of exhilaration, stupefaction, extreme weakness and pallor are the chief symptoms.

THERAPEUTICS.

Externally.—Being easily obtainable comphor is a favourite domestic ingredient for many liniments, for **lessening the pain of lumbago, myalgia** and chronic **rheumatism.** The liniment has been applied to **stimulate the absorption** of the effused products in **sprains and inflammatory swellings of joints** rheumatic or otherwise. The ammoniated camphor liniment and the turpentine and acetic acid liniment are very effective **counter-irritants in bronchitis, pleuritis** and **broncho-pneumonia.** Camphor has been dusted on **indolent sores** and in combination with dusting powders on **eczema** and **intertrigo.** Mixed with zinc ointment (½ dr. to 1 oz.) it allays the itching of **eczema genitalis.** Dissolved in chloroform and mixed with simple ointment, it has been found to soothe the **irritation of piles.** Spirits of camphor arrest the progress of **boils** and **bedsores** if applied in the earliest stages. Chloral-Camphor and Menthol Camphor are most valuable local anodynes in superficial **neuralgias.**

Internally. **Alimentary canal.**—Mixed with chalk it is often used as a tooth-powder (1 in 8), and with prepared *pan* as a corrective of foul breath. Chloral-Camphor relieves **toothache** when put into a carious tooth. Camphor Julep—Mist. (aqua) Camphoræ B.P. 1864—is a domestic carminative for **flatulence** and **colic** of children. Spirits of camphor may be given in flatulence and colic of adults. Very few medicines can excel camphor in **summer diarrhœa** and **cholera.** It should be given in these cases from the commencement of the illness in 5 to 6 m. doses every 10 or 15 minutes till the symptoms abate and then hourly. It is useless in the later stages. Many consider Rubini's solution more efficient in these cases.

Respiratory tract.—The inhalation of camphor or its use in snuff form relieves **coryza** and that form of chronic **catarrh** which is characterised by **paroxysmal sneezing.** At the same

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

time 5 drops should be given by the mouth every 15 minutes. It is exceedingly useful in **chronic bronchitis** if given either in the form of Paregoric or in pill form in combination with Hyoscyamus.

Circulation.—Graves recommends camphor in **adynamic fevers**, saying that it strengthens and reduces the frequency of the pulse, controls the delirium and moistens the skin. In Germany it is considered to be a valuable cardiac stimulant in threatened **cardiac failure**. The writer often uses camphor and musk together as a cardiac stimulant in the **collapse** of **fevers** and other diseases.

Nervous system.—In many **spasmodic affections**, such as, nervous palpitation, chorea, hysteria, whooping cough, &c., it has been given with doubtful results.

Genital organs.—Large doses check inordinate **sexual desire** and **chordee**. Applied to the breast and given by the mouth in 3 gr. doses, camphor acts as an **antigalactogogue**.

Prescribing hints.—It is best given dissolved in milk (1 dr. in 1 oz). The essence or Rubini's tincture on sugar or in emulsion. Powdered camphor may be given in pills or cachets. Hypodermically it may be given dissolved in almond oil (1 in 5) in collapse (Binz).

CANNABIS INDICA.

Indian Hemp. N. O. *Cannabinaceæ*.

Syn. I. V.—*Gánjá*, Beng. Hind.
Haschich, is a confection of Hemp.
Gánjá,—the flowering tops of the female plants, coated with resin.
Charas, is the resin scraped off the leaves.
Bhâng, is a drink made from the powdered leaves.

Habitat.—India, chiefly in Bengal.

Source.—The dried flowering or fruiting tops of the female plants of *Cannabis Sativa*, grown in India from which no resin has been removed.

There are three varieties, *viz*,—(1) *flat*, (2) *round*, and (3) *powdered* (*chur*) Ganja. The last one is best suited for pharmaceutical preparations. *Ganja two years old loses all its active properties.*

Characters.—In compressed, rough, dusky-green masses consisting of the branched upper part of the stem, bearing leaves and pistillate flowers or fruits matted together by a resinous secretion. Upper leaves simple alternate, 1-3 partite. Lower opposite, digitate. Fruits one-seeded supported by a bract.

Composition.—(1) An active constituent a *Resin* known best as *cannabinon*. (2) A *Volatile Oil*. (3) An unimportant alkaloid.

Incompatibles.—Water and watery infusions precipitate the resin.

Action.—Deliriant, anodyne, hypnotic.

Official Preparations.

1. **Extractum Cannabis Indicæ.**—A rich green resinous extract. **B. P. Dose.**—¼ to 1 gr. *Enters into.*—

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. **Tinctura Cannabis Indicæ.**—1 in 20. 22 ms. contain 1 gr. of extract. Deep green. **B.P. Dose.**—5 to 15 ms. *Enters into.*—Tr. Chlorof. et Morph. Co.

Non-Official Preparations.

1. **Cannabinæ Tannas.**—An amorphous yellowish powder sparingly soluble in water. An uncertain hypnotic. *Dose.*—2 to 10 grs.

2. **Cannabinon.**—A purified resin like treacle. *Dose.*—¼ to 1 gr. The resin that naturally exudes from the leaves and stem is called **Charas.**

Pharmacology.

Externally.—In the opinion of the writer Indian hemp has a feeble **anodyne** property.

Internally. **Gastro-intestinal tract.**—In small doses it sharpens appetite which becomes sometimes so ravenous that it cannot be appeased by food. It also promotes digestion. If indulged in for long it may cause loss of appetite and gastric derangement. It does not cause constipation or diarrhœa.

Nervous system. (1) *Cerebrum.*—Its chief action is on the cerebral convolutions, resembling in many respects that of alcohol or opium but is uncertain in its effects. This is due to (*a*) variations in the strength of the drug and (*b*) individual peculiarities. In small doses either smoked or taken by the mouth, it causes **pleasurable sensations** with gay, joyful and exalted ideas and a refreshed feeling, particularly after bodily or mental fatigue. Under its influence the knowledge of time and personality is lost. Should it be continued, it causes **intoxication** and loss of self control. The drugged man becomes very talkative and laughs at everything, passing into a sort of "waking delirium." Hence, it is an **exhilarant** and **deliriant.** The delirium, generally noisy and restless, is accompanied by muscular excitement. and is followed by **sleep,** which is often attended with delightful dreams. Sometimes there is a considerable amount of heaviness in the head and the patient feels "a sensation as of the brain boiling over and lifting the cranial arch." In large doses it induces a sort of **catalepsy,** followed by coma and death from cardiac failure.

(2) *The Sensory nerves* are paralysed and there is a sense of tingling and **anæsthesia** of the skin. The muscular sense is also lost and pain if present is lessened or removed. Hence it is an **anodyne** but is not so powerful as opium or belladonna.

Heart and circulation.—Its action on the heart is uncertain. The pulse may be either first quickened, then slowed, or *vice versa,* probably from its effects on the cardio-inhibitory centre and the heart-substance. The blood-pressure therefore either rises or falls.

Respiration is first quickened and afterwards slowed.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Temperature may rise during the stage of excitement and fall during sleep.

Kidneys.—The secretion of urine is slightly increased from the increased blood-pressure, but prepared *bhang*, *sidhi* or *sabji* produces copious diuresis.

Muscles.—In small doses motor activity is increased and in large doses depressed, owing to relaxation of the muscles. It is therefore an **antispasmodic.**

Genital organs.—In small doses it acts as an **aphrodisiac,** chiefly by stimulating the cerebrum and reflexly the genital centre, (see p 164) and partly by dilating the pelvic blood vessels. Repeated stimulation of the sexual organs is followed by impotence.

Toleration.—Like opium or alcohol, a tolerance of the drug is soon induced. *Habitués* may smoke ganja to the extent of about half an ounce or more per diem.

Acute toxic action.—Poisoning by Indian hemp is rather rare. When it occurs, the symptoms are those that have already been alluded to: catalepsy being most important.

Antidotes.—Emetics or pump if swallowed. Vegetable acids especially lime juice, cold affusion, stimulants, strychnine, counter-irritation to the nape of the neck.

Chronic toxic action.—*Ganja*-smoking is very prevalent in India, and if persevered in, it causes loss of appetite, emaciation, trembling gait, insanity (mania or melancholia) and mental weakness. **Hashish,** an Arabian aromatic confection of Indian hemp, produces similar effects. **Bhang**—a cold infusion of leaves and fruits with aromatics—is daily indulged in by most of the people of the North Western Provinces without much deleterious effects.

THERAPEUTICS.

Externally.—Mixed with linseed-meal (1 in 4), Indian hemp in the form of a poultice has been found by the writer to allay the irritation and pain of **inflamed piles** and **anal fissure.** The dry leaves (*sidhi*) warmed may be used as a fomentation for the same purpose. A watery paste of *charas* relieves **anal pruritus.**

Internally. **Gastro-intestinal tract.**—As an *appetiser* and *stomachic tonic* it has been found valuable in **dyspepsia, dyspeptic diarrhœa** and also in some forms of **chronic dysentery.** The natives of this country use *prepared bhang* (see above) in these diseases. It has been found to soothe the pain of **gastralgia** and correct the griping property of purgatives.

Respiratory tract.—Either by inhalation or administered internally, it is a valuable antispasmodic in the hacking cough of **phthisis** or the paroxysms of **asthma** or **whooping cough.**

Nervous system.—As an *analgesic* Indian hemp is most valuable in **migraine.** In fact, it was the chief remedy for this and other **headaches** before the introduction of phenazone and its congeners. Even now, it is used occasionally with great benefit in **continuous headaches,** especially those occurring at the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

menopause, or due to worry and fatigue. As a *hypnotic* it is not generally used now, though it has been found sometimes useful in **insomnia, delirium tremens** and **mania** when given with bromides. Sir Russell Reynolds strongly recommends the extract (¼ to ⅓ gr.) in **senile insomnia**. With chloral hydrate it may be serviceable in **chorea**. As an *anodyne antispasmodic*, it is well spoken of in **intestinal, biliary** and **renal colics, spasm** of the **bladder** and **chordee**. Its beneficial effects in **tetanus** have been long recognised. The writer can testify to its value from long personal experience.

Genital organs.—In **metrorrhagia, spasmodic** and **nervous dysmenorrhœa**, and **ovarian irritation**, it not only relieves the pain but seems to act favourably on the uterine muscular fibres. Occasionally it is used in **subacute gonorrhœa** and **impotence**.

Kidneys.—In acute and chronic **Bright's disease** it has been found to allay pain in the renal region, and remove **hæmaturia**.

Malarious fevers.—The writer believes in its mild **antiperiodic** and **prophylactic** virtues against **malarious fevers**, and expressed this his opinion before the Royal Hemp Commission held in Calcutta, in 1894.

Prescribing hints.—The extract is given in pill massed with liquorice powder. On account of the uncertainty of its composition it is safer to commence with a small dose, for toxic symptoms have been produced by one grain. The tincture may be given on sugar or suspended by mucilage of acacia (1 dr. to 1 oz.)

CANTHARIS. Cantharides.

N. O. *Coleoptera*.

Syn.—Spanish or blistering fly, lytta.

Habitat.—Spain, Italy, Hungary and Russia. Those from Russia are supposed to be the best.

Source.—The dried beetle, *Cantharis vesicatoria*.

Characters.—¾ to 1 in. long, ¼ in. broad, with 2 long elytra or wing-sheaths of a shining green or coppery-green colour, under which are 2 thin, brownish, transparent, membranous wings. Odour strong and disagreeable.

Identification.—The entire beetle is easily identified. Its powder can be recognised by its dark-brown colour, *offensive odour* and *shining particles* of *wing-sheaths*. The last two are very characteristic.

Composition.—(1) *Cantharidin*, active principle up to 1 p. c. (2) A *Volatile Oil*, giving the odour. (3) A green *Fixed Oil*, the colouring principle, allied to chlorophyll.

Action.—Rubefacient, vesicant, diuretic. *Dose.*—$\frac{1}{10}$ to ½ gr.

Dispensing hints.—A piece of camphor kept with the fly prevents the ravages of insects.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparations.

1. **Acetum Cantharidis.** *Syn.—Vinegar of Cantharides.*—1 in 10. Dark brown. Vesicant.

2. **Collodium Vesicans.** *Syn.—Blistering Collodion.*—1 in 2. Vescicant.

3. **Emplastrum Calefaciens.** *Syn. B. P.—Warming plaster.*—1 in 25 nearly. A firm yellow coloured plaster. A stimulant application.

4. **Emplastrum Cantharidis.**—1 in 3 nearly. A dark brownish substance. Blisters in from 7 to 9 hours.

5. **Liquor Epispasticus.** *Syn.—Blistering Liquid.*—1 in 2. A greenish brown volatile liquid. Vesicant.

6. **Tinctura Cantharidis.**—1 in 80 A pale straw coloured liquid. **B. P. Dose.**—5 to 15 ms. ; if frequently repeated 2 to 5 ms.

7. **Unguentum Cantharidis.**—1 in 10 nearly. Yellowish brown. Rubefacient. Milder than Em. Cantharidis. Promotes discharge from a blistering surface.

Non-Official Preparations and Derivatives.

1. **Cantharidin.**—White crystalline scales, soluble in oils, fats, acetic acid and alcohol. A terrible poison. Is used to promote the growth of hair.

2. **Anodyne Vesicant.** *Syn.—Boni's Blister.*—Camphor 20 Chloral Hydrate 30. Melt and add cantharides 10. Digest at 150 for 1 hour and strain with pressure.

3. **Cantharides Lotion.**—Sp. Ammon. Arom. 2, Glycerin 1, Tr. Canthar. ½, Aq. Rosmarini to 20. Stimulates the growth of hair.

4. **Cantharides Hair Oil** (Whitla).—Ol. Rosmarini 4 drs. Liq. Epispastici 2 drs., Ol Amigdal. Dul. 1½ ozs., Sp. Camph. 2 ozs., Glyc. Boracis 1 oz., Ol. Rosæ 8 drops, Tr. Jaborandi 1 oz. Mix. To be rubbed into the roots for the growth of hair.

5. **Potassii Cantharidas.**—In white needles, soluble in water. Advocated by Liebreich in tuberculosis. *Dose.*—$\frac{1}{1000}$ to $\frac{1}{333}$ gr. hypodermically.

Pharmacology.

Externally.—Locally applied to the skin, cantharides does not show any sign of action until after 2 or 3 hours, when tingling and burning are felt on the part, soon followed by redness; referable to the irritation of the local nerves and the dilatation of the local blood-vessels. Vesicles appear next which run together and form one large bleb. Hence it is an **irritant, rubefacient and vesicant**, but its action is slower than many others of the same class. Cantharidin is freely absorbed by the skin.

Internally. **Gastro-intestinal canal.**—Unless given in very minute doses well diluted, cantharides causes severe **irritation** of the mouth, fauces, stomach and bowels, producing burning pain in the mouth, throat, and abdomen and vomiting and purging. The vomit, aud the motions may contain blood. Therefore it is a most powerful **gastro-intestinal irritant.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Urinary organs.—Cantharidin absorbed from the skin, or stomach and bowels, is slowly excreted by the kidneys, which it stimulates and acts as a **diuretic**. In large doses it causes pain in the loins, and burning and scalding in the bladder and urethra leading to **strangury, albuminuria** and **hæmaturia**. These symptoms are due to active inflammation of the glomeruli, which spreads to the cells of the tubules until all the tubes are involved, and to irritation of the fundus and sphincter of the bladder.

Genital organs.—In poisonous doses it inflames the genital organs and causes violent priapism and numerous seminal emissions. It produces **congestion** of the **uterus** and may bring on menstruation or abortion.

Metabolism.—Its effects on tissue-change are not known, but urine which had been previously acid becomes sometimes alkaline after a few blisters. It is also said that blisters promote phagocytosis causing much absorption of oxygen from the increased passage of air through the lungs (Robin).

Acute toxic action.—Besides the irritant effects on the alimentary and genito-urinary tracts already described, it affects the heart, respiration and nervous system producing quickened pulse and respiration, headache, mental confusion, loss of sensibility, convulsions, dyspnœa, and death.

Antidotes.—Emetics, pump, mucilaginous drinks, raw eggs. *Oils and fats should be avoided as they increase the solubility of the drug.* Morphine or opium suppository, and free diluents and Sitz bath to relieve strangury.

Chronic toxic action.—Long continued small doses cause organic changes almost similar to those that occur in phosphorus poisoning.

THERAPEUTICS.

Externally.—The therapeutic indications as a counter-irritant, have been fully described in page 144, only some of the specific uses of cantharides are given below :—

1. *To increase local circulation and thereby promote local nutrition*, cantharides is used well diluted in the form of hair-lotions or hair-oils in the **falling off of hair** and **alopecia**. On the same principle it may benefit when painted on **chronic ulcers** or injected into **chronic sinuses** and **fistulæ**.

2. *To relieve pain* of **neuralgias**, blisters should be applied over the posterior branch of the spinal nerve-trunk close to the spine, for if they are put on the seat of pain, they intensify the suffering. In **sciatica** they may be used as flying blisters along the course of the nerve. If pain is caused by a localised inflammation, it is relieved by the direct application of a blister over the seat of inflammation, as in **acute articular rheumatism**.

3. *To promote absorption of morbid products*, blisters may be applied over the joints in **chronic rheumatism**, **synovitis** and **arthritis**; over the chest in **pleuritic** or **pericardial**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

effusions; over the abdomen in subacute peritonitis, ovaritis, pelvic cellulitis, chronic thickening of the intestine caused by dysentery, appendicitis or other affections; over glands in indurated sympathetic buboes and adenitis.

4. *To reduce inflammation*, a blister should be applied a little away from the seat of inflammation, as in pericarditis and pleuritis in thin subjects. Counter irritation behind the ear or high up on the temple reduces inflammation of the eyes and on the perineum relieves prostatitis or proctitis.

5. *To arrest spasm and reflex disturbances*, blisters over the epigastrium, are very useful in obstinate vomiting or gastric cramp; and over the pneumogastric in the neck in whooping cough.

Internally.—Cantharides is only occasionally used nowadays because it is such a powerful irritant, but it may sometimes be given with benefit, in small doses, for the relief of chronic gleet or chordee.

Caution.—Cantharides blisters should be avoided or very cautiously applied to children; weak, anæmic and old persons; pregnant women and those who are subject to renal disease, as they may cause strangury. Neither should they be applied to the back of bed-ridden patients or to paralysed limbs, otherwise they may produce troublesome sores.

Prescribing hints.—To prevent absorption of the cantharidin the cantharides plaster should only be kept on till the vesicles form (about 3 to 5 hours), when a hot poultice will help the rising of a bleb. It is then generally punctured to let out the serum and dressed with cold cream or vaseline. Savine or cantharides ointment may occasionally be applied to keep up the discharge. Sometimes we apply flying blisters, *i. e.*, a series of small blisters, each not larger than a shilling or eight anna bit, kept on for about two hours in one spot, then removed and applied a few inches away for two or three hours, and so on until the affected area is covered. Before applying a blister, the skin should be thoroughly washed with soap and water and rubbed with a towel until the part becomes reddened. The plaster sometimes requires warming before application.

One or two minims of the tincture are enough for an ordinary dose, and it must be freely diluted with mucilage or barley water.

CAOUTCHOUC. India-Rubber.

N. O. *Euphorbiaceæ.*

Habitat.—Brazil, India.

Source.—The milky juice of *Hevea brasiliensis* and other species; known as pure Para rubber.

Characters.—In elastic masses, brownish-black externally, mottled with a pale tint internally. *Solubility.*—In chloroform, oil of turpentine, carbon bisulphide, benzol, petroleum spirit.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Composition.—It is polymeric with and closely related to terpenes. Combines with sulphur to form vulcanized India-rubber.

OFFICIAL PREPARATION.

1. **Liquor Caoutchouc.**—1 in 20. *Enters into.*—Charta Sinapis.

USES.

It is used for its physical properties in the preparation of protective coverings.

CAPSICI FRUCTUS. Capsicum.

N. O. *Solanaceæ.*

Syn.—Small chillies. Guinea Pepper, Pod pepper. **Syn. I.V.**—*Dhâni Lânkâ*, Beng. *Gâch Marich*, Hind.

Habitat.—Zanzibar, Sierra Leone, Nepal.

Source.—The dried fruit of *Capsicum minimum.*

Characters.—Dull orange-red, oblong-conical, obtuse, 2-celled, ½ to ¾ in. long, ¼ in. in diameter, containing 10 to 20 small flat seeds. Odour characteristic. Taste intensely pungent.

Action.—Rubefacient, stomachic, stimulant. *Dose.*—½ to 1 gr. in pill.

OFFICIAL PREPARATIONS.

1. **Tinctura Capsici.**—1 in 20. Brandy coloured. **B.P. Dose.**—5 to 15 ms. *Enters into.*—Tr. Chlorof. et Morph. Comp.

2. **Unguentum Capsici.** *Syn.*—*Chillie paste.*—1 in 4½. A reddish coloured ointment. Stimulant, rubefacient.

NON-OFFICIAL PREPARATIONS.

1. **Capsicin.** *Syn.*—*Oleo-Resinæ Capsici. U.S.P. Dose.*—⅛ to ¼ gr.

2. **Emp. Capsici. U.S.P.**—In myalgia and sciatica.

3. **Tr. Capsici. Fort. B.P.C.** *Syn.*—*Lin. Capsici.*—Capsicum 10 ozs., Alcohol (90 p.c.) *q.s.* to 1½ pint. Macerate for 24 hours, then percolate. *Dose.*—1 to 3 ms. Practically it is used externally in swollen chilblains.

4. **Ung. Oleo-Resinæ Capsici. B.P.C.**—Oleo-resin 1, Yellow-Wax ½, Benzoated Lard 4. Melt and mix. A mild counter-irritant. Will bear dilution 3 to 6 times.

PHARMACOLOGY.

Externally.—The action of capsicum is like that of volatile oils, and to some extent that of cantharides. In other words, it is a powerful **irritant, rubefacient** and therefore **counter-irritant.**

Internally. **Alimentary canal.**—In small doses it stimulates the secretion of saliva and gastric juice and increases peristaltic movements. It is therefore a **sialagogue, stomachic tonic** and **carminative.** In large doses it is a **gastro-intestinal irritant.** The writer once treated a case of acute dysentery brought on by taking a large quantity of capsicum.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

It is a cardiac and vascular **stimulant**, feeble **narcotic**, **diuretic** and **aphrodisiac**. Prof. Cheron thinks that it acts on the blood-vessels like ergot.

THERAPEUTICS.

Externally.—Like cantharides, capsicum may be used to promote the growth of hair. The plaster may be applied in **rheumatism**, **lumbago** or **torticollis**. A piece of lint soaked in an infusion of the pods and covered with oiled silk may be used for the same purpose. The tincture is a valuable remedy for chilblains.

Internally.—It is chiefly used as a condiment in India. The tincture mixed with tannic acid (1 dr. of each in water 10 ozs.) makes a useful gargle in **relaxed throat**, simple **tonsillitis** and chronic **pharyngitis**. It is an excellent medicine in atonic and flatulent **dyspepsia** and **dypsomania**. In the last, it not only checks the craving but stimulates and tones the gastric functions. It may induce sleep in **delirium tremens** if the cayenne pepper is given in 20 to 30 gr. doses in a bolus made with honey (Lyons). Tr. Capsicum 2 drs., Sp. Ammon. Arom. 6 drs., Sod. Bromid. 2 drs., Tr Cinch. Co. 4 drs., Aq. Chlorof. to 8 ozs. $\frac{1}{12}$th part every 2 or 3 hours until the craving for drink is removed. The above prescription will generally be found to be an effective "pick-me-up."

CARBO LIGNI.

Wood Charcoal. (Carbon.)

Source and characters.—A black powder free from grittiness, prepared by exposing wood to a red heat without access of air.

Action.—Antiseptic, absorbent, deodoriser.

B. P. Dose.—60 to 120 grs.

PHARMACOLOGY.

Externally.—Dry charcoal absorbs and condenses gases within its pores, especially oxygen, which it parts with to oxidise organic or other substances either liquid or gaseous. Hence it is a **disinfectant** and **deodoriser**. In the same way it oxidises colouring matters and is therefore a **decolouriser**. It has no action on living organisms.

Internally.—In the stomach and intestine it absorbs and oxidises gases and irritating fluids, and thus acts as an **absorbent** and **deodorant**, but this property is lost as soon as it gets thoroughly moistened. But this does not occur very readily and some oxygen is retained in its pores, by which it may exert its influence, though in a less degree, on the gases and fluids in the intestine. Therefore, it is a gastro-intestinal **disinfectant**. In large doses it acts as a gentle **purgative** passing out with the fæces unchanged.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

THERAPEUTICS.

Externally.—Since the introduction of more powerful antiseptics, charcoal is not much used now. In **phagedænic ulcers** or **gangrene** it may yet be used with advantage in the form of a charcoal poultice.

Internally.—It is often used as a **dentifrice** but it is apt to injure the enamel. It may be given in **flatulent** and **acid dyspepsia.** By removing flatulence, disinfecting fæces and diminishing reflex movements, it may be of use in **diarrhœa.** Jenner recommends it in **enteric diarrhœa.** It is an **antidote** for alkaloidal and phosphorus poisoning.

Prescribing hints.—It may be given in cachets or simply wrapped up in a wafer paper or in combination with soda and pepsin. In poisoning it must be given by table-spoonfuls. Charcoal biscuits are useless for medicinal purposes.

CARBONIS BISULPHIDUM.

Carbon Bisulphide. CS_2.

Source.—May be prepared by combining carbon and sulphur at a high temperature and condensing the product.

Characters.—A clear, colourless, highly refractive liquid; odour characteristic. Sp. gr. 1·268 to 1·269. *Solubility.*—1 in 500 of water, readily in alcohol, ether, chloroform, &c. *Impurities.*—Sulphur, sulphuretted hydrogen.

Enters into.—Liq. Caoutchouc and Pil. Phosph.

ACTIONS AND USES.

In pharmacy it is used to dissolve India rubber and phosphorus. It is an active poison, an antiseptic, and an anæsthetic like chloroform when inhaled.

CARDAMOMI SEMINA.

Cardamom Seeds. N.O. *Scitamineæ.*

Syn. I. V.—*Elâchi*, Beng.

Habitat.—Guzerat, Malabar, Ceylon.

Source.—The dried ripe fruits of *Elettaria Cardamomum.* The seeds should be kept in their pericarps and separated when required for use.

Characters.—Commonly known.

Composition.—(1) A *Volatile Oil*, containing a terpene called terpenene. (2) A *Fixed Oil.* The pericarp is inactive medicinally.

Action.—Carminative, antispasmodic. *Dose.*—5 to 10 grs.

Enters into.—Ext. Colocyn. Co, Pulv. Cinnam. Co., Pulv. Cretæ Arom. Tr. Gent. Co., Tr. Rhei Co. and the

OFFICIAL PREPARATION.

1. **Tinctura Cardamomi Composita.**—1 in 80. Deep red colour. **B.P. Dose.**—½ to 1 dr. *Enters into.*—Decoc. Aloes Co. and Mist. Sennæ Co.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

NON-OFFICIAL PREPARATIONS.

1. **Oleum Cardamomi.**—A pale aromatic volatile oil.

2. **Tr. Carminativa. B.P.C.**—Cardamom Seeds 600 grs., Stronger Tincture of Ginger 1¼ ozs., Oils of Cinnamon, Caraway and Cloves each 100 ms., Alcohol (90 p.c.) *q.s.* to 1 pint. A flavouring agent. *Dose.*—2 to 10 ms.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Cardamom seeds are a **stimulant, stomachic** and **carminative** and are therefore useful in flatulence and in correcting the griping property of purgatives. The tincture is a colouring and flavouring agent.

CARUI FRUCTUS.

Caraway Fruit. N. O. *Umbelliferæ.*

Syn. I.V.—*Jirá* Beng. *Shia-jirá*, Hind.

Habitat.—Europe, India.

Source.—The dried fruit of *Carum Carvi.*

Characters.—Mericarps separate; each ⅛ to ¼ in. long, $\frac{1}{16}$ in. broad; brown with paler ridges, slightly curved, tapering, glabrous. Odour aromatic. Taste aromatic, agreeable.

Identification.—It resembles Conium and Fennel. Caraway has small ridges and a spicy taste.

Composition.—(1) The *Volatile Oil* (*off.*).

Action.—Stimulant, antispasmodic, carminative.

Enters into.—Conf. Pip., Pulv. Opii Co,, Tr. Card. Co., Tr. Sennæ Co. and the

OFFICIAL PREPARATIONS.

1. **Aqua Carui.**—1 in 10. *Dose.*—1 to 2 ozs.

2. OLEUM CARUI. Oil of Caraway.

Source.—The oil distilled from caraway fruit.

Characters.—Colourless or pale yellow, having the odour and taste of the fruit. Sp. gr. 0·910 to 0·920.

Composition.—(1) *Carvone.* (2) *Carvol.* (3) *Limonene.* (4) *Cymene.* (5) *Cuminol.*

Enters into.—Pil. Aloes Barb. **B.P. Dose.**—½ to 3 ms.

PHARMACOLOGY AND THERAPEUTICS.

The actions and uses are the same as those of Anethi Fructus (see p. 238).

CARYOPHYLLUM.

Cloves. N. O. *Myrtaceæ.*

Syn. I.V.—*Labanga*, Beng. *Long*, Hind.

Habitat.—Zanzibar, Penang, Bancoolen, &c.

Source.—The dried flower-buds of *Eugenia Caryophyllata.*

Characters.—½ in. long, dark-brown, wrinkled, sub-cylindrical; calyx which tapers below is surmounted by 4 thick, rigid, patent teeth,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

between which are 4 paler imbricated petals enclosing stamens and a single style. Odour strong spicy. Taste pungent, aromatic. *Should emit oil when indented with the finger nail.*

Composition.—(1) *Volatile Oil* (*oil*) 18 p. c. (2) *Eugenin*, a crystalline substance. (3) *Caryophyllin*, a neutral body isomeric with camphor. (4) *Gallo-Tannic Acid.* (5) *Gum*, &c.

Action.—Carminative, stimulant, aromatic, tonic.

Enters into.—Inf. Aurantii Co., Pulv. Cretæ Arom. and the

Official Preparations.

1. Infusum Caryophylli.—1 in 40 (¼ hour).

B.P. Dose—½ to 1 oz. *Incompatibles.*—Lime water, iron salts, mineral acids and gelatin.

2. OLEUM CARYOPHYLLI. Oil of Cloves.

Source.—Distilled from cloves.

Characters.—Colourless or pale when recent, becoming reddish-brown gradually. Sp. gr. not below 1.050.

Composition.—(1) *Eugenol*, chemically resembling phenol. (2) *Acetyl-eugenol.* (3) *Caryophyllene*, a hydrocarbon.

Enters into.—Pil. Coloc. Co., Pil. Coloc. et Hyosc.

B.P. Dose.—½ to 3 ms.

Pharmacology.

Externally.—Oil of cloves acts like camphor, but causes more tingling, smarting, warmth and redness, followed by anæsthesia. It is therefore a local **stimulant, rubefacient, counter-irritant** and **anæsthetic.** It is also a **parasiticide** and **antiseptic.**

Internally. **Mouth.**—The local action of the oil of cloves on the mouth is the same as on the skin. It reflexly stimulates the **secretion** of **saliva** and **mucus** by exciting the peripheral nerves, and **sharpens** the **taste** by stimulating the nerves of taste and smell. Simultaneously, the gastric circulation is reflexly excited with increased flow of the gastric juice.

Stomach.—On reaching the stomach it directly **stimulates** the **nerves** and **blood-vessels** of the stomach, thereby **accelarating** the **secretion** of the **gastric juice** and **stimulating** the **peristaltic movements** It is therefore a **stomachic tonic** and **carminative.** Like camphor or alcohol, it also reflexly **stimulates** the **heart** and moderatly increases the rate and force of the pulse.

Intestine.—Some of the oil finding its way into the bowels produces the same action there as on the stomach, causing increased circulation, increased secretion, increased peristalsis and increased expulsion, of flatus, but no absorption of gases (Brunton), relieving any spasm, if present. Hence it is an **intestinal antispsmodic.**

Heart, blood and circulation.—It enters the blood un-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

changed and is partly oxidised by the red blood corpuscles. It increases the **number of white corpuscles**. The heart may be stimulated to a slight extent by its direct action on it, but chiefly by the reflex action from the stomach. By temporarily exciting the cerebral, medullary and spinal centres either directly through the circulation, or, as is generally the case, reflexly from the stomach, it increases the functional activity of the organs and relieves spasmodic contractions of the various parts of the body. Therefore it is a feeble **general stimulant** and **general antispasmodic**.

Elimination.—The oil of cloves, like other volatile oils, is eliminated by the kidneys, genito-urinary tract, skin, bronchial mucous membrane, liver and probably the bowels. In its passage through, it **stimulates** and **disinfects** their **secretions** but not so powerfully as turpentine or many other volatile oils.

The above applies more or less to almost all the volatile oils.

THERAPEUTICS.

Externally.—On account of its high price oil of cloves cannot be freely used. Occasionally it is applied as an *anodyne* in superficial **neuralgias**. Very often it is employed for flavouring hair-oils and liniments. It is also very useful for **keeping off mosquitoes**, for which purpose a little should be rubbed on to the hands and feet immediately before returning to rest. In this way it acts as a **prophylactic against malaria**.

Internally.—Cloves are generally used in cookery to improve flavour, and with aromatic bitters, as Inf. Aurant. Co., to stimulate appetite and digestion. The oil relieves **toothache** when put into the cavity of the decayed tooth. It is an excellent remedy for **intestinal colic** and **flatulence**. It may be combined with purgatives to prevent their griping.

Prescribing hints.—The oil is best given on a lump of sugar, or triturated with sugar as *elæosacchara* (see p. 68), or suspended in mucilage.

CASCARA SAGRADA.

Cascara Sagrada. N. O. *Rhamneæ.*

Syn. B.P.—Rhamni Purshiani Cortex, Sacred Bark.

Habitat.—California.

Source.—The dried bark of *Rhamnus purshianus* (California buckthorn).

Characters.—In quilled or flat pieces, 4 in. long, $\frac{3}{4}$ in. wide, $\frac{1}{16}$ in. thick. Cork smooth, purplish-brown, almost covered with lichens. Inner surface reddish-brown, longitudinally striated. Odour characteristic. Taste nauseous, bitter.

Composition.—(1) *Cascarin*, a neutral principle. (2) *Three Resins*,—red, yellow and brown. (3) *Acids*,—tannic, malic and oxalic. (4) A *Volatile Oil.*

Action.—Tonic, laxative, cholagogue.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparations.

1. **Extractum Cascaræ Sagradæ.**—A dry extract.
B.P. Dose.—2 to 8 grs.
2. **Extractum Cascaræ Sagradæ Liquidum.**—1 in 1. Black.
B.P. Dose.—½ to 1 dr.
3. **Syrupus Cascaræ Aromticus.** *Syn.—Cascara Elixir.*—1 in 2½. **B.P. Dose.**—½ to 2 drs.

Non-Official Preparation.

1. **Ext. Cascar. Sag. Liq. Inspid. B.P.C.** *Dose*—½ to 2 drs.

Pharmacology.

Internally. **Gastro-intestinal canal.**—In small doses (5 to 10 ms) of the liquid extract, cascara has a decidedly **tonic effect** on the stomach, promoting appetite and helping digestion. In moderate doses (½ to 1 dr.) it gently stimulates glandular secretion, but its action is upon the peristaltic movements of the bowels. Hence it is a **laxative**, producing healthy, copious and bilious stools, for it is also a **hepatic stimulant.** In large doses it is a gastro-intestinal **irritant.**

Therapeutics.

Internally.—Cascara is the most valuable *aperient* we have for **habitual constipation**, due to torpidity either of the liver or of the intestines. The dose ought to be so regulated as to produce a soft, painless, natural motion every morning, and when the desired end is gained, it should then be gradually reduced. The great advantage of the drug is that the dose does not require to be increased to maintain its action. However, for the successful cure of constipation it must be continued for at least 2 or 3 months.

Prescribing hints.—The solid extract is best given in pills either alone or with nux vomica and aloes. The nauseous taste of the liquid extract may be concealed by aromatics and glycerin, or aromatics and chloroform. The plain aromatic syrup is not an unpleasant vehicle. The aromatic syrup of cascara is a pleasant preparation. The uncertainty of its action is sometimes most annoying to the physican. This chiefly arises from the use by the manufacturers of inferior bark or the barks of allied species.

CASCARILLA. Cascarilla.

N. O. *Euphorbiaceæ.*

Habitat.—Bahamas Islands.
Source.—The dried bark of *Croton Eluteria.*
Characters.—In quills, 1 to 3 in. long, ⅛ to ½ in. in diameter, or in small curved pieces. Externally dull-brown or dark-grey, longitudinally wrinkled, covered with silvery grey patches and black dots. Fracture

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

short, resinous. Odour agreeable, aromatic, especially when burned. Taste aromatic, bitter.

Identification.—It resembles pale Cinchona Bark, which is smooth, small and not so white.

Composition.—(1) *Cascarillin*, a white inodorous crystalline alkaloid. (2) *Betaine.* (3) *Tannic Acid.* (4) *Volatile Oils.* (5) *Starch.* (6) *Resins.*

Incompatibles.—Mineral acids, lime water, metallic salts.

Action.—Aromatic, bitter tonic.

Official Preparations.

1. **Infusum Cascarillæ.**—1 in 20 (¼ hour). Decomposes in hot weather. **B.P. Dose.**—½ to 1 oz.
2. **Tinctura Cascarillæ.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

Pharmacology.

Internally.—Cascarilla belongs to the group of aromatic bitters, and therefore possesses the combined properties of pure bitters and aromatic oils. It is therefore an **aromatic, stomachic tonic, and carminative.** Some say it is a feeble febrifuge.

Therapeutics.

Internally.—It is not unpleasant to take. It is often given in combination with other bitters in flatulent or atonic dyspepsia as a *stomachic tonic* after febrile diseases. The bark may be used as a **substitute for tobacco** to wean heavy smokers from the habit.

Prescribing hints.—The infusion will scarcely keep good for a day in the summer unless mixed with an aromatic tincture. Diluted mineral acids precipitate the resin when given with the tincture, but the addition of the infusion prevents it to a certain extent.

CASSIÆ PULPA. Cassia Pulp.

N. O. *Leguminosæ.*

Syn. I.V.—*Sonddler dtá*, Beng *Amaltás*, Hind.

Habitat.—East and West Indies.

Source.—The pulp obtained from the pods of *Cassia Fistula.*

Characters.—The *pulp* viscid, nearly black, with a faint odour and sweet taste. The *pods* 1½ ft. to 2 ft. long, ¾ to 1 in. in diameter, cylindrical, shortly stalked, blackish-brown, divided internally by transverse partitions into numerous cells, each containing a seed surrounded by pulp.

Composition.—(1) A *Purgative Principle*, allied to cathartic acid. (2) *Sugar.* (3) *Pectin.* (4) *Mucilage.*

Action.—Laxative. *Dose.*—60 to 120 grs. as a laxative; 1 to 2 ozs. as a purgative.

Enters into.—Conf. Sennæ.

Pharmacology and Therapeutics.

Internally.—Cassia pulp is never given alone on account of its griping properties but with senna in the form of a confection.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

CATECHU. Catechu.

N. O. *Rubiaceæ*

Syn. B.P.—Catechu Pallidum. **Syn. I.V.**—*Khayer*, Beng. *Kath*, Hind.

Habitat.—Singapore, Eastern Archipelago.

Source—An extract of the leaves and young shoots of *Uncaria Gambier*.

Characters.—In cubes, sometimes agglutinated. Each 1 in. deep, reddish-brown externally, pale cinnamon-brown internally, porous, friable. Taste at first bitter and astringent, then sweetish. No odour.

Solubility.—Entirely in boiling water, 75 p.c. in alcohol (90 p.c.).

Impurities.—Earthy matter and starch.

Composition.—(1) *Catechu-tannic Acid*, the active principle which is converted into catechin by boiling or by saliva. (2) *Catechin* or *Catechuic Acid.* (3) *Pyrocatechin* or *Catechol*, which gives a green colour with ferric chloride.

Incompatibles.—Alkalis, metallic salts, gelatin.

Action.—Powerfully astringent. **B.P. Dose.**—5 to 15 grs.

Official Preparations.

1. **Pulvis Catechu Compositus.**—1 in 2½. Stock it in a stoppered bottle. **B.P. Dose.**—10 to 40 grs.; 2 to 5 grs. for a child 1 year old.
2. **Tinctura Catechu.**—1 in 5. A rich coffee-brown liquid. **B.P. Dose.**—½ to 1 dr.; 5 to 10 ms. for a child 1 year old.
3. **Trochiscus Catechu.**—1 gr. in each. In sore throat. *Dose.*—1 to 6.

CATECHU NIGRUM.

Black Catechu. N.O. *Leguminosæ.*

(Ind. and Col. Addendum.)

Habitat.—India and Burma.

Source.—An extract prepared from the wood of *Acacia Catechu.*

Characters.—In irregular masses of a dark-brown colour.

Solubility.—Partially in cold, freely in boiling water.

Actions and Doses.—The same as those of catechu.

Black catechu may be used in making official preparations for use in India, and the Eastern and North American Colonies.

Pharmacology and Therapeutics.

Internally.—Both the pale and the black catechu are **non-irritating astringents**, acting like tannic acid which they contain. It is a valuable *local astringent* and may be used in the form of a dentifrice, gargle, or lozenge for **spongy gums, mercurial and ulcerative stomatitis, and relaxed throat.** The natives of India suffer little from the diseases of the mouth and gums because of their habit of chewing *prepared pan* (see p. 275), which contains alkaline, astringent (catechu) and antiseptic

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

substances. It is a very useful medicine for **diarrhœa** and in the early stages of **cholera**, being often prescribed with opium, kino and chalk (see p. 291).

CERA FLAVA.

Yellow Beeswax. N.O. *Hymenoptera.*

Syn. I.V.—*Mom*, Beng. Hind.

Habitat.—Britain and other countries.

Source.—Prepared from the honeycomb of the Hive-Bee, *Apis Mellifica.*

Characters.—Firm, yellowish. Odour agreeable, honey-like. Not unctuous to touch. *Solubility.*—Entirely in hot oil of turpentine, partially in alcohol (90 p.c). *Impurities.*—Starch, paraffin, &c.

Composition.—(1) *Myricin* (myricyl palmitate). (2) *Cerotic Acid.*

Enters into.—Cera Alb., Emp. Calefac., Emp. Canth., Emp. Picis, Ung. Hyd. Co., Ung. Menthol, Ung. Picis Liq., Ung. Resinæ, and Ung. Staphisagriæ.

CERA ALBA. White Beeswax.

Source and **Characters.**—In white translucent masses or cakes made by bleaching yellow wax by exposure to moisture, air and light.

Enters into.—Pill. Phosph., Supposit. Acid. Carbolic., and Ung. Aquæ Rosæ.

Actions and Uses.

They are chiefly used as a basis for plasters and ointments. If the basis of the latter becomes too soft on account of the prevailing high temperature, extra white beeswax or yellow beeswax may be added to render it more suitable for use.

CEREVISIÆ FERMENTUM. B.P. 1885.

(Non-Official).

Syn.—Fæx Medicinalis. Beer yeast, Saccharomyces cerevisiæ.

Yeast may be administered either in the crude form as obtained from the brewers or as one of the various proprietary dried yeasts, which are sold under the names of **Levurine, Cerevisine, Zymine, etc.**

Dose.—Of yeast, ½ to 1 oz. ; of the dried preparations, a tea-spoonful. Should be given with meals, dissolved either in beer or sweetened water.

Non-Official Preparations.

1. **Nuclein.** *Syn.—Nucleol.*—Obtained from yeast—a combination of nucleinic acid with albuminates and hydrocarbons. *Dose.*—10 to 60 ms. of a 5 p.c. solution, either by mouth or hypodermically. Recommended in tubercle, cancer, and various septicæmic conditions. Its value is doubtful.

2. **Nargol, Mercurol** and **Cuprol.**—Combinations of Nucleinic acid with silver, mercury and copper. 5 p.c. solution used in ophthalmic practice.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

It was originally supposed that the active principle of yeast is nuclein which it contains, and that on this account it is both a **leucocyte-stimulant** and **bactericide**. It must be remembered however that in addition to *nuclein* yeast contains many *enzymes*, and that it gives rise to many other products, partly as a result of fermentation and partly by its action upon the metabolism of liver cells. It is undoubtedly a valuable remedy in the treatment of **boils, carbuncle** and **acne**.

As regards its use in the treatment of tuberculosis it was at one time in danger of falling into disuse, but recent observations made at Davos-Platz, have demonstrated the fact that it is of undoubted value in the treatment of cases of **chronic phthisis**, and that it causes a marked rise in the "Opsonic index" of the blood *i.e.* it increases the amount of the strange substance which Wright has called "Opsonin," the function of which is to prepare tubercle bacilli for digestion by the leucocytes. It does not cause a leucocytosis, as was formerly supposed. On the contrary, as the opsonic index rises there is a steady fall in the leucocyte count, so that yeast cannot be regarded as a leucocyte-stimulant and it is therefore very doubtful whether nuclein is its active principle.

CERII OXALAS.

Cerium Oxalate. $Ce_2(C_2O_4)_3, 9H_2O$.

Source and Characters.—A white granular powder insoluble in water, obtained by the interaction of a soluble cerium salt and a soluble oxalate. *Impurities.*—Lanthanum oxalate, didymium oxalate, arsenic, iron, aluminium, zinc, calcium, &c.

Action.—Gastric sedative. **B.P. Dose.**—2 to 10 grs.

Pharmacology and Therapeutics.

Internally.—It is a **gastric sedative**, but how it acts is not known. It is said to be efficacious in **chronic cough**, and is recommended in **sea-sickness** and the **vomiting of pregnancy**.

Prescribing hints.—The writer has given it in 15 to 20 gr. doses every 3 or 4 hours without much effect. It may be given in cachets, pills or suspended in water.

CETACEUM.

Spermaceti. N. O. *Cetacea.*

Habitat.—Pacific and Indian Oceans.

Source.—A concrete fatty substance, obtained, mixed with oil, from the head of the sperm whale, *Physeter macrocephalus*. It is separated from the oil by filtration and pressure, and is afterwards purified.

Characters.—In crystalline, pearly-white, glistening, translucent masses with little taste and no odour. Reducible to powder by means of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

a little alcohol (90 p. c.). *Solubility.*—In ether, chloroform, boiling alcohol (90 p. c.), not in water.

Composition—(1) *Cetin*, a fat formed by the combination of citylic alcohol with palmitic acid.

Enters into.—Ung. Aquæ Rosæ, Ung. Capsici and the

Official Preparation.

1. **Unguentum Cetacei.**—1 in 5. An emollient and cooling dressing for blistered surfaces and sores, and for cases where Benzoated lard is unsuitable as the eye or piles.

Uses.

It is chiefly used as a basis for ointments and cerates.

CHIRATA.

Chiretta. N. O. *Gentianaceæ.*

Syn. I.V.—*Chiretá* Beng. *Chirayatá*, Hind. *Bhunimba*, Sans.

Habitat.—Northern India.

Source.—The dried plant, *Swertia Chirata*, collected when in flower.

Characters.—*Stem* 3 ft. or more, long, smooth, brown, winged, branched above, rounded below. *Branches* slender, decussate. *Leaves* opposite, ovate, glabrous, entire. *Flowers* small, numerous panicled. *Fruits* superior, bicarpellary, unilocular. No odour. Taste extremely bitter. *Impurities.*—*Ophelia angustifolia* (sweet chiretta), *O. alata*, *Andrographis paniculata*, &c. The last is sometimes erroneously called Indian chiretta.

Identification.—It resembles somewhat *Lobelia*, which is not bitter.

Composition.—(1) *Chiratin*, an active amorphous bitter principle in combination with (2) *Ophelic Acid.* No tannic acid.

Action.—Bitter tonic, stomachic.

Official Preparations.

1. **Infusum Chiratæ.**—1 in 20 (½ hour). **B.P. Dose.**—½ to 1 oz.
2. **Liquor Chiratæ Concentratus.**—1 in 2.
B. P. Dose.—½ to 1 dr.
3. **Tinctura Chiratæ.**—1 in 10. Tea-coloured.
B.P. Dose.—½ to 1 dr.

Non-Official Preparation.

1. **Essence of Chiretta.**—As sold in Calcutta, it is an aromatic liquid extract. *Dose.*—1 to 2 drs.

Pharmacology and Therapeutics.

Internally.—Being a pure, non-astringent bitter, its actions and uses resemble those of calumba (*q. v.*), but it has some influence on the liver. It is particularly useful in indigestion with torpidity of the liver and bowels. It can be given with iron. It is often combined with dilute nitro-hydrochloric acid.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

CHLORAL HYDRAS. Chloral Hydrate.

Trichlorethylidene Glycol. $CCl_3CH(OH)_2$.

Source.—Obtained by the addition of water to the liquid chloral produced by the action of dry chlorine gas on ethylic alcohol.

Characters.—In colourless. monoclinic plates. Odour pungent, not acrid. Taste pungent, bitter. *Solubility.*—Freely in water, alcohol (90 p.c), ether and chloroform. *Impurities.*—Free chlorides, hydrochloric acid, chloral alcoholate and oily matters.

Identification.—The shape and size of the crystals and the peculiar penetrating odour help recognition. The crystals of butyl-chloral hydrate are smaller though they possess a somewhat similar smell.

Incompatibles.—Alkaline substances which liberate chloroform.

Action.—Hypnotic. **B.P. Dose.**—5 to 20 grs. *Max. Dose.*—40 grs. *Daily Dose.*—90 grs.

Official Preparation.

1. **Syrupus Chloral.**—10 grs. in 1 dr. **B.P. Dose.**—½ to 2 drs.

Non-Official Preparations and Derivatives.

1. **Suppositoria Chloral.**—5 grs. in each. See p. 96.
2. **Chloral Camphoratum. B.P.C.**—1 in 1. Rub together in a warm mortar until liquefied. An effective local anodyne.
3. **Liq-Bromo Chloral Comp. B.P.C.**—See p. 281.
4. **Chloralamide.** *Syn.—Chloral Formamide.* P.G.—Bitter shining crystals soluble in water. Hypnotic, not analgesic. It does not weaken the heart nor tend to form a habit like chloral. *Dose.*—15 to 45 grs.
5. **Chlorobrom.**—Contains chloralamide 30 grs. and potassium bromide 30 grs in 1 oz. flavoured with liquorice. *Dose.*—½ to 1 oz.
6. **Chloralose.** *Syn.—Anhydro-gluco-chloral.*—Small white crystals prepared by the action of chloral on glucose. Induces dreamy sleep. Not a safe hypnotic. *Dose.*—3 to 10 grs.
7. **Hypnal.**—A compound of chloral and antipyrine. A sedative hypnotic useful in cases where there is cough or pain. Contra-indicated in cardiac affections. *Dose.*—15 to 20 grs.

Pharmacology.

Externally.—In a concentrated form it is an **irritant** and **vesicant.** The diluted solution is **antiseptic.**

Internally. **Alimentary canal.**—In large doses chloral hydrate is a **gastro-intestinal irritant.** In medicinal doses well diluted it is not so.

Blood.—It is readily absorbed and circulates unchanged. It is not converted into chloroform and formic acid by the alkalis in the blood, as was originally thought by Liebreich.

Heart and circulation.—Large doses markedly **depress the heart** and finally arrest it in diastole. This is due to its direct action on the **cardiac muscle.** The pulse, after a brief period of excitement, becomes slow, feeble and intermittent. The

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

vaso-motor centre is also **depressed**, causing **dilatation** of the **blood-vessels**. As a consequence of these actions, the **blood-pressure** is considerably **lowered**.

Respiration.—In moderate doses no effect on respiration is observed, but in toxic doses the breathing becomes slower, shallower and irregular, and finally, stops with the simultaneous arrest of the heart.

Temperature.—Chloral hydrate tends to lower the body-heat, and in toxic doses there is a marked **diminution** of the **temperature**, due to (1) the dilated condition of the peripheral vessels and (2) the diminished production of heat in the muscles.

Cerebrum.—In moderate doses after a transitory excitement, it induces a sort of soothing drowsiness soon followed by refreshing sleep indistinguishable from natural slumber; without producing any bad after-effects, such as headache, drowsiness or sickness. Hence it is a pure **hypnotic**. It induces sleep in two ways:—(1) directly, by lessening the activity of the brain-cells, and (2) indirectly, by dilating the vessels throughout the body and somewhat lessening the force of the heart. Larger doses cause prolonged sleep leading to coma. The **pupils** are **contracted** by small doses and in large doses they first contract, then dilate.

Spinal cord.—The **anterior cornua** are first **stimulated**, then **powerfully depressed**, with abolition of **reflex excitability**. Probably chloral acts first on the grey matter, as painful impressions are not felt when reflex excitation can still be induced (Brunton).

(1) *Motor nerves* and *muscles* are not affected directly.

(2) *Sensory nerves* are not affected unless very large doses be given.

Thus, it will be seen that chloral hydrate is a **powerful depressant** to (*a*) the *cerebrum*, (*b*) the *respiratory centre*, (*c*) the *vaso-motor centre*, (*d*) the *anterior cornua of the cord*, (*e*) the *heart*, and (*f*) possibly the *thermogenetic centre* (?).

Kidneys.—It escapes partly unchanged, but chiefly as uro-chloralic acid. Large doses cause nephritis and hæmaturia. There may also be glycosuria.

Elimination.—It escapes chiefly by the kidneys and partly by the lungs and skin.

Acute toxic action.—Acute poisoning is rare. The writer has seen only one case—a habitual drunkard who died after taking 80 grs The symptoms are profound sleep, merging into deep coma; lividity of the face; pallor; cold sweat over the forehead and heads; slow, laboured and afterwards shallow and feeble breathing; frequent, feeble, and irregular pulse *marked fall of temperature*, which may be so great as alone to cause death (Brunton); pupils contracted and afterwards dilated; and absolute muscular relaxation. Death takes place from paralysis either of the heart or of the respiratory centre.

Antidotes.—Emetics or pump. Friction: external warmth; stimulants, such as ammonia, ether, &c.; sinapisms over the chest and nape

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of the neck ; electricity ; amyl nitrite inhalation ; atropine, strychnine, caffeine hypodermically. The patient if he can be roused should not be allowed to sleep. A pint of strong coffee may be injected into the rectum, as recommended by Murrell.

Chronic toxic action or **Chloralism.**—Craving for chloral is soon generated in those who are addicted to its use. Gastro-intestinal disturbance ; cutaneous eruptions, such as erythema, pustules, vesicles, &c. : bodily and mental weakness ; sudden flushing ; dyspnœa and palpitation are prominent symptoms. Death often results from an over-dose. The best treatment is the gradual withdrawal of the daily dose with generous diet, fresh air, tonics and nervine sedatives, such as hyoscyamus.

Physiological antagonists.—Atropine, strychnine, physostigmine, picrotoxin.

THERAPEUTICS.

Externally.—As a *vesicant*, powdered chloral hydrate may be sprinkled over a gently warmed adhesive plaster and applied. It produces an effective painless blister. As a *local anodyne* Chloral Camphor or Chloral c. Menthol may be painted over superficial **neuralgic areas**, and applied within **carious painful teeth.** The efficacy of any of these combinations, may be greatly augmented by the addition of morphine or cocaine. A lotion (8 grs to 1 oz.) is an antiseptic, anodyne, stimulating application to **unhealthy** or **foul ulcers**, and may cure **eczema.**

Internally.—As a *pure and simple hypnotic* it is unrivalled in **sleeplessness** due to worry, overwork or old age, but not to pain. In doses of 15 to 20 grs. it induces a refreshing sleep, which thus obtained not infrequently leads to the repeated use of the drug, and thereby induces the **chloral-habit.** It is very efficacious in **febrile insomnia** in the early stages, but must be given cautiously in the later stages when there is danger of cardiac failure. It is a most valuable remedy for **delirium tremens.** In combination with bromide of potash it will often check the disease in the early stages. The method of administration is as follows :—During the day 20 grs. of sulfonal, dissolved in a glass of warm milk or broth should be given every 3 hours, then at 8 P. M. administer 20 grs. of chloral with 20 grs. of potassium bromide and repeat the dose every 2 hours as long as the patient remains awake. If this produces sleep, the patient may wake up perfectly cured. But it must not be continued for too long lest it produce fatal results by depressing the heart already weakened by alcoholic excesses. In the same manner it may be given in **mania**, puerperal or otherwise. It is much extolled in **sea-sickness** and **vomiting** of **pregnancy.** As a *depressant to the motor tracts of the cord and a paralyser of reflex excitability*, it is a very valuable drug in convulsive diseases, particularly in **puerperal eclampsia, tetanus, strychnine-poisoning, hydrophobia, tetanus neonatorum** and **infantile convulsions,** when given with bromides. The addition of a few drops of the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

tincture of Indian hemp to the chloral and bromide mixture has given very satisfactory results in tetanus in the writer's hands. Many other spasmodic affections, such as **chorea, asthma whooping cough, paralysis agitans, spasmodic intestinal colic** are benefited by it. It is an excellent medicine for lessening the **rigidity** of the **os** and other soft parts during parturition. It does this without affecting the uterine contractions. Chloral hydrate subcutaneously injected (5 to 10 grs.) removes cramps in **cholera**, but the injection causes burning, inflammation, and sometimes suppuration. As a *general anodyne* it is far inferior to morphine, though it may relieve mild attacks of **neuralgias** of any nerve except the fifth (see butyl-chloral hydrate), it also lessens the pain in **urinary, biliary** and **intestinal colic**; and in **gastrodynia**. By referring to the following table, the student will be better able to understand the difference between the actions and uses of chloral hydrate and morphine—

Chloral Hydrate.	Morphine.
1. A quicker, a more certain and a more refreshing hypnotic.	A slower, a more uncertain and a less refreshing hypnotic.
2. No after-effects, such as headache, depression and sickness. (Sometimes heaviness or sleepiness only.)	Always headache, confusion and narcotism.
3. No constipation. No gastro-intestinal derangement in medicinal doses.	Always constipation, and sometimes nausea.
4. Cannot relieve excessive pain nor induce sleep in insomnia caused by it.	Can relieve pain and induce sleep in insomnia caused by it.
5. Cannot relieve reflex cough, but can relieve convulsive diseases.	Can relieve reflex cough, but cannot relieve convulsive diseases.

Caution—Being a powerful cardiac depressant, it should be given with great caution to old, gouty, rheumatic, hysterical delicate, and otherwise constitutionally weak persons. It should not be given to confirmed drunkards, except when absolutely necessary for the treatment of delirium tremens. It is contra-indicated in diseases of the heart, blood-vessels and lungs, and in nephritis. In a person susceptible to its action, small doses (10 to 15 grs.) may sometimes produce redness of the eyes and conjuctivitis.

Prescribing hints.—The aromatic or ginger syrup best covers its pungent taste. It may be given by the rectum (see p. 95) or subcutaneously (see above).

CHLORUM. Chlorine. Cl. (*Non-official.*)

This gas is usually obtained from Calx Chlorinata and Liquor Sodæ Chlorinatæ. Acidum Nitro hydrochloricum dilutum contains some free chlorine.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

CALX CHLORINATA.

Chlorinated Lime. $CaCl_2$, $CaCl_2O_2$.

Syn.—Bleaching powder.

Source.—Obtained by exposing slaked lime to chlorine gas until absorption ceases. Should contain not less than 33 p.c. of chlorine. $2CaH_2O_2 + 2Cl_2 = CaCl_2O_2$, $CaCl_2 + 2H_2O$.

Characters.—A dull white powder with a characteristic smell. Becomes moist and gradually decomposes on exposure to air.

Solubility.—Partially in water.

Dispensing hints.—It should be preserved in well stoppered bottles.

Enters into.—The preparation of chloroform and the

Official Preparation.

1. **Liquor Calcis Chlorinatæ.**—1 in 10. Yields when fresh 3 p. c. of Cl. Antiseptic, deodoriser. Preserve it in a stoppered bottle in a cool and dark place.

LIQUOR SODÆ CHLORINATÆ.

Solution of Chlorinated Soda. NaCl,NaClO.

Syn.—Labarraque's disinfecting fluid.

Source and **Characters.**—A colourless alkaline liquid with an astringent taste and odour of chlorine, obtained by mixing a solution of sodium carbonate with one of chlorinated lime. $CaCl_2O_2, CaCl_2 + 2Na_2CO_3 = (NaCl, NaClO)_2 + 2CaCO_3$.

Dispensing hints.—Preserve it in a stoppered bottle in a cool and dark place.

Action.—Antiseptic, disinfectant. **B.P. Dose.**—10 to 20 ms.

Non-Official Preparation of Chlorine.

1. **Liquor Chlori.** (Burney Yeo).—Put powdered potassium chlorate 30 grs. into a 12 oz. bottle and pour over it strong hydrochloric acid 1 dr., cork, shake and allow gas to generate, then add water by degrees shaking after each addition. Into this solution dissolve 24 to 36 grs. of quinine and 1 oz. of syrup of orange peel. *Dose.*—1 oz. every 2, 3 or 4 hours in typhoid fever.

Pharmacology.

Externally.—Chlorine has a great affinity for hydrogen, and consequently decomposes chemical and organic compounds which contain it, such as, ammonia, sulphuretted hydrogen, and many organic matters. It also destroys putrefactive and septic germs. Hence it is a powerful **disinfectant** and **deodorant.** Applied to the skin for a long time, as in the case of workmen in a manufactory of bleaching powder, it causes itching, redness and inflammation, leading even to vesication or sloughing. Inhaled in a concentrated form it is a powerful irritant to the respiratory passages and may cause death from spasm of the glottis or inflammation of the air-passages. Inhaled greatly diluted with air, it is a stimulating **expectorant.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Both chlorinated lime and chlorinated soda are powerful **disinfectants** and **deodorisers**, because they give off hypochlorous acid—an active oxidising agent. Being unstable, the acid is soon decomposed and liberates chlorine and oxygen. The former greedily attacks hydrogen, and the latter the oxidisable constituents of many chemical and organic substances with which it may come in contact. On this account Liq. Calcis Chlorinatæ is used in testing for **Indicanuria**.

Internally.—It exerts the same local influence on the parts with which it comes in contact, until decomposed into chlorides in the stomach, when it loses its virtues as an uncombined element.

THERAPEUTICS.

Externally.—As a *disinfectant* and *deodorizer*, chlorinated lime is often poured into drains, privies, urinals, bed-pans, &c. Moistened with water it may be put in saucers in different parts of a sick-room to disinfect the air. If the room requires a speedy disinfection, chlorine gas may be quickly generated by pouring sulphuric acid on salt and black oxide of manganese; the room being closed up for 24 hours. The chlorine thus liberated attacks the hydrogen of the ammonia and sulphuretted hydrogen present in the atmosphere of the room.

As a *stimulating antiseptic application*, chlorine water or a solution of chlorinated lime or of chlorinated soda may be used for **wounds** and **ulcers** which have a fetid discharge or a tendency to slough. It is also useful for injecting into **cavities** with **foul discharges**.

As a *parasiticide* any of the solutions may be found useful in **ringworm** and **scabies**.

Internally.—In **malignant sore-throat**, **diphtheria**, **mercurial salivation**, and **sloughing stomatitis**, either of the solutions may be used with advantage as a gargle (½ to 1 dr. to 1 oz.). A solution of chlorine is recommended in septic diseases, such as **typhoid fever** and **septicæmia**, but the results are not encouraging. Burney Yeo's chlorine mixture has not proved successful in the writer's hands, though it relieves flatulence. The great drawback to its use is its extremely nauseous taste.

CHLOROFORMUM. Chloroform.

Trichloromethane. $CHCl_3$.

Source.—May be prepared by heating a mixture of chlorinated lime, slaked lime, ethylic alcohol and distilled water. Sufficient absolute alcohol is added to make the sp. gr. 1·490 to 1·495

Characters.—A limpid, colourless, heavy, volatile liquid; not inflammable. Odour sweet, penetrating. Taste sweet, pungent. *Solubility.*—1 in 200 of water, 10 in 7 of alcohol (90 p.c.), freely in ether and most fixed and volatile oils. Chloroform dissolves caoutchouc, mastic, elemi, tolu,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

benzoin, copal, iodine, organic alkaloids, &c. *Impurities.*—Hydrocarbons, non-volatile compounds including chlorides left after evaporation; carbonyl chloride from age and exposure to light; free acids; free chlorine.

Tests for purity—(1) It should neither turn blue litmus paper red (absence of acids); nor (2) produce a white precipitate except a slight opalescence with $AgNO_3$ (absence of chlorides); nor (3) afford any colour with cadmium iodide and starch (absence of chlorine); nor (4) a yellow colour with H_2SO_4 (absence of hydrocarbons); nor (5) any residue and unpleasant odour after evaporation; and nor (6) a change of colour with potash (absence of aldehydes).

Identification.—It is recognised by its characteristic *smell*, weight and volatility (see Ether 206).

Dispensing hints.—It should be kept in blue or amber coloured stoppered bottles in a cool and dark place, as it decomposes in the presence of light and air in combination.

Action.—Anæsthetic, sedative, carminative, antispasmodic, rubefacient, anodyne. **B.P. Dose.**—1 to 5 ms.

Official Preparations.

1. **Aqua Chloroformi.**—¼ m. in 100. Powerfully antiseptic. *Dose*—½ to 2 ozs.

2. **Linimentum Chloroformi.**—1 in 2. Rubefacient and anodyne.

3. **Spiritus Chloroformi.** *Syn.*—*Chloric Ether, Spirit of Chloric Ether.*—1 in 20. A sweetening agent. **B. P. Dose.**—5 to 20 ms. for repeated use; 30 to 40 ms. for a single dose.

4. **Tinctura Chloroformi et Morphinæ Composita.**—A substitute for **Chlorodyne.** Antispasmodic, narcotic. **B. P. Dose**—5 to 15 ms.

Non-Official Preparations.

1. **A. C. E. Mixture.**—Alcohol (90 p.c.) 1, Chloroform 2, Ether 3. Mix. A safer and yet an effective general anæsthetic in protracted operations. Should be dropped on an open mask.

2. **Chloroformum Camphoratum. B. P. C.**—Camphor 2, Chloroform 1, dissolve. A useful local anodyne.

3. **Tr. Chlorof. Comp. B. P. C.**—Chloroform 2, Alcohol (90 p.c.) 8, Tr. Card. Co. 10. Mix. *Dose*—5 to 60 ms.

4. **Camphorodyne**—A substitute for **Chlorodyne.**—Pulv. Camph. 1 oz., Chloroform 2 ozs., Ol. Menth. Pip. ½ oz., Tr Cannab. Ind. 2 ozs., Tr. Capsici 1½ ozs., mix and set aside, Morph. Hyd. 32 grs. Acid Hydrochloric dil. ½ oz., Distilled Water to 1 oz.; mix by the aid of heat and set aside. Acid. Hydrocyanic. Dil. 1 oz., Mucil. Acacia B. P 1½ ozs., Treacle 5 ozs., Syrup B. P. *q. s.*; mix and add the two previous mixtures (lastly the camphor). Shake and add syrup to 16 ozs. *Dose.*—15 to 30 ms.

Pharmacology.

Externally.—Like alcohol or ether, chloroform when allowed to evaporate constricts the local blood-vessels and paralyses the peripheral sensory nerves, and is therefore a powerful **local refrigerent and anæsthetic.** If evaporation be prevented or if it be rubbed into the skin, it causes **rubefaction** and if the application be prolonged it may lead to **vesication.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Internally. **Mouth.**—In a concentrated form, it is a **local irritant**, producing a hot burning sensation. Well diluted, it has a **warm sweetish taste**. It is a local **anæsthetic** and a **reflex excitant** of the **salivary secretion**.

Stomach and intestine.—Chloroform acts like alcohol or ether on the stomach. In medicinal doses it produces (*a*) a sensation of warmth in the epigastrium, (*b*) an increased gastric vascularity, (*c*) an increased flow of the gastric juice, and (*d*) increased but regular peristaltic movements of the stomach and intestine. Hence it is a **stomachic tonic** and **carminative**. In the intestines it has a slightly **sedative** and **astringent** effect, especially when given in the shape of chlorodyne. In large doses it is a **gastro-intestinal irritant**, causing vomiting and purging, followed by stupor, coma and abolition of reflex sensibility.

Heart and Circulation—It readily enters the blood from the respiratory tract, stomach, abraded surfaces and when subcutaneously injected. We do not know what changes occur in the blood: probably a portion of it is decomposed. In medicinal doses, given by the mouth, it certainly **strengthens the cardiac contractions**, but its effect though more rapid than that of alcohol passes off more speedily. Long continued administration causes enfeeblement of the heart, but no change in the pulse rate, except in the last stage when the heart becomes dilated and its rhythm irregular. The **blood vessels** and **capillaries dilate** after complete anæsthesia from **paralysis** of the **vaso motor centre.**

Respiration.—During the administration of chloroform, respiration is at first slowed, then quickened, and afterwards it again slows down but it remains steady. Finally it becomes not only slow but irreglar and at last it stops altogether.

Nervous system—Chloroform acts on the **nervous system** in somewhat the same manner as alcohol, but its action is more rapid and it appears to derange the mental faculties from the beginning. It follows the two laws already described on page 158. For convenience of description, its action on the nervous system may be divided into **four stages.**—

First stage, or that of **Imperfect Consciousness.**—This begins with a feeling of warmth on the surface, sounds in the head, flashes of light before the eyes, choking or suffocation or sometimes cough, (especially if the vapour is concentrated), and confusion of ideas. Sounds are faintly heard, questions are imperfectly answered, and pain, if present, is not much felt, indicating a blunting of the general sensibility.

Second Stage, or that of **General Stimulation.**—The patient is no longer conscious of external impressions, but according to temperament, he may sing, cry, shout, or struggle (hence some authors call this "the struggling stage"). At times the struggling is so hard that the patient holds his breath, the face becomes

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

livid, the eyes protrude and the jugular veins distend. Almost coincidently the **lower centres are stimulated**; the pulse becomes frequent, the heart and large vessels throb, respiration becomes quickened, blood-pressure rises and the pupils become slightly dilated.

Third Stage, or that of Anæsthesia.—This is characterised by the *paralysis of the nerve-centres which have previously been excited, and the abolition of reflex action and sensation.* If the inhalation is continued, the patient becomes completely unconscious: his limbs quite flaccid, and if one of them is held up it falls like that of a corpse; only a sluggish contraction of the iris follows when the eyes are suddenly exposed to light; the **pupils are contracted**; and the **conjunctival reflex is completely abolished**. The pulse falls in volume and frequency, respiration becomes slow and deep, sometimes stertorous, and the blood-pressure falls from paralysis of the vaso-motor centre. This is the **proper stage for operation.** 1 to 4 drs. of chloroform is generally necessary to bring about **complete anæsthesia.**

Fourth Stage, or that of Paralysis.—If chloroform is pushed further, the **lowest reflex centres are paralysed,** causing a **complete loss of muscular tone,** so that the patient passes urine and stools involuntarily, and all the muscles become completely flaccid. Sometimes the surgeon is obliged to push the inhalation to this extent, to enable him to reduce dislocations or to examine abdominal viscera through the abdominal wall. If the inhalation is still continued, the **pupils dilate,** which is *an indication of the commencement of asphyxia,* and of paralysis of the **vaso-motor, respiratory and cardiac centres.** It is therefore an important "*danger-signal.*" The **blood-vessels and capillaries now dilate and the blood-pressure falls to** zero. Respiration becomes shallower, weaker and irregular and often stops before the arrest of the heart. The pulse grows feeble and intermittent, and finally the heart stops in diastole.

Causes of death under chloroform.—There has been much controversy as to whether death takes place from the heart or from the lungs. The two Commissions appointed by the Nizam of Hyderabad came to the conclusion that respiration fails before the heart. But the correctness of this view has been strongly disputed. According to Hare the cause of death is the extreme fall of blood-pressure, as the result of which a large amount of blood accumulates in the dilated capillaries, and the heart stops because there is no blood for it to contract upon. Be that as it may, death may occur from (1) *the arrest of respiration,* due either to the paralysis of the respiratory centre or to mechanical causes; from (2) *direct paralysis of the heart from shock,* which may happen in any stage without warning; or from (3) a *sudden failure of both the heart and respiration* at any stage.

Summary of actions.—Chloroform affects the nervous

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

system in the following order :—first, the cerebrum including the mental faculties ; secondly, the sensory part of the cord : thirdly, the motor tract of the cord; fourthly. the sensory paths of the medulla, leading to abolition of reflex excitability ; fifthly, the centres in the medulla particularly the respiratory and the vaso-motor ; and lastly the cardiac muscle. This order is sometimes altered, for instance the heart may be paralysed before the respiration.

Recovery from chloroform anæsthesia takes place in the reverse order. The lowest functions (*e.g.*, the muscular tone) reappear first, then after a while the consciousness, and lastly the mental equilibrium.

Involuntary muscles and peripheral nerves.—The involuntary muscles are not obviously affected, for the parturient uterus contracts under chloroform narcosis. The peripheral nerves are affected only a little before death.

Vomiting is very liable to occur during the administration of chloroform, its advent being heralded by pallor of the face, cold sweats, and dilatation of the pupils.

THERAPEUTICS.

Externally.—As a *local anodyne* chloroform is far inferior to other agents, though it may be combined with them with advantage, as it promotes absorption through the skin of many substances, *e.g.*, the alkaloids. Hence the chloroformic liniments of aconite and belladonna, or a mixture of the liniments of aconite, belladonna and chloroform (see p. 202) may be applied in **myalgia, lumbago, chronic rheumatism, pleurodynia** and **pleurisy.** If rubefaction or counter-irritation is desired, the liniment of chloroform may be sprinkled over a piece of folded cloth or lint and covered with oiled silk Two or three drops of chloroform on a pellet of cotton wool introduced into the ear relieve **toothache** or **faceache.** The pain of **cancer** and **pruritus pudendi** may be temporarily relieved by the use of the chloroform spray. In the form of an ointment (½ dr. to 1 oz. of lard) it may be used to allay the itching of **prurigo, lichen** and **urticaria.** A deep hypodermic injection (10 ms.) near the sciatic nerve relieves **sciatica** but cocaine is better for this purpose.

Internally. **Gastro-intestinal tract.**—A pledget of cotton wool soaked in chloroform and introduced into the cavity of a painful carious tooth relieves **toothache.** It is an excellent medicine for disguising the unpleasant taste (see p. 116) of many drugs. One to three drops of chloroform may check **vomiting, sea-sickness** and **flatulent distention.** In **diarrhœa** or in the beginning of **cholera,** spirit of chloroform may be usefully given with opium or other astringents. Chlorodyne and camphorodyne are also very efficient remedies in these cases. Chloroform

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

is very serviceable in **intestinal** and other **colics** because of its *antispasmodic effect*. It is usual to give it in those cases with opium or morphine.

Heart.—As a *diffusible cardiac stimulant* it is generally given in depressed conditions of the system or spirits, nervous exhaustion, &c.

Respiratory tracts.—Combined with opium or morphine it allays many **coughs**, especially if they are paroxysmal or violent.

Inhalation.—Besides its internal uses, chloroform may be given as an inhalation in the following cases—

1. *To produce anæsthesia during* **surgical operations.**
2. *To relax muscular spasm* during the reduction of **dislocations**, or **hernias**, the setting up of **fractures**, or during **catheterisation**.
3. *For the purpose of diagnosis*, as in the case of young children or hysterical subjects. For the examination of abdominal viscera or to ascertain whether a particular swelling is a real or a phantom tumour.
4. *To relieve the intense pain of certain diseases*, such as **biliary, intestinal** and **renal colics. neuralgias**, &c.
5. *To relieve the spasms* of many convulsive diseases, such as **tetanus, strychnine-poisoning. hydrophobia, puerperal eclampsia, chorea, uræmia**, &c. The distressing dyspnœa of **asthma** and of **aneurism** and the violence of the paroxysms of **whooping cough** and **hiccough** may be lessened by the inhalation of a few drops poured on to a handkerchief
6. *To relieve suffering or to relax the rigidity of the os or other soft parts during parturition*, a moderate inhalation may be given with benefit during the pains, but only after full dilatation of the os.

Administration of chloroform.—There are **two methods** of administering chloroform almost without danger. The first is to give it in small quantities well diluted, gently and cautiously increasing the strength; and the second is to administer it in large doses more or less concentrated. Each of these plans has its advantages. The former takes a longer time and causes no shock, while the latter takes a shorter time; and if there is any shock at all, it is induced at a time when the system can best bear it.

The following practical hints should be particularly attended to while administering chloroform :—

1. Chloroform should be perfectly **pure**. The A.C. (alcohol and chloroform) mixture or A. C. E. mixture is only indicated in cases where there is a fatty or weak heart, or where the operation is likely to be a protracted one (see p. 338).
2. **No solid food** should be given for at least six hours before the administration. Morning is the best time for chloroforming, as the patient then is in a refreshed condition and may easily be kept without food.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

3. All **tight clothes** about the neck, chest and abdomen should be removed or materially loosened. Attendants' or dressers' hands should not press upon the chest or abdomen while holding the patient.

4. Artificial teeth should be removed.

5. The safest position of the patient is the dorsal decubitus.

6. As the **undivided attention** of the chloroformist is essential for the safety of the patient, the operator should not undertake to administer the chloroform and to operate at the same time.

7. Chloroform should be freely diluted, with air.

8. An ordinary handkerchief or a piece of lint folded in the form of an open cone within which some absorbent cotton has been stitched is the best inhaler in the absence of Junker's apparatus which does not allow a greater concentration of chloroform than 5 per cent. If a cone is used it should not be held either too close to, or too distant from, the mouth and the nose. The proper distance throughout the inhalation is the nearest which does not cause choking, struggling or holding of breath.

9. If the patient is weak, a small dose of brandy or whisky may with advantage be given before the inhalation is begun.

10. If lint is used, not more than 20 or 30 ms. should be sprinkled on to it at a time. Some anæsthetists prefer to commence with double this dose, so as to lessen the period of excitement.

11. Pay particular **attention** to the breathing, as most of the accidents are caused by respiratory failure. Irregularity of breathing is generally caused by insufficiency of air, which makes the patient struggle or hold his breath.

12. No operation should be commenced until the patient is under **complete anæsthesia**, as shown by the absence of the corneal reflex. The administration should never be pushed to the stage of stertorous breathing and complete relaxation of muscles, except when it is absolutely necessary as for the reduction of old-standing dislocations.

13 Directly the **corneal sensibility** is **lost** or **respiration** becomes **stertorous**, the **inhalation** must be **suspended**. In case the stertor comes on while the cornea is still sensitive, the inhalation should not be proceeded with, as it invariably happens that the cornea becomes insensitive within a few seconds afterwards

14. The patient's head should invariably be turned to one side, the lower jaw depressed and the tongue drawn forward if necessary during vomiting, so that no vomited matter may enter the larynx. Should this accident happen laryngotomy must be at once performed.

15. **Pallor** of the **face** is best controlled by lowering the head and giving amyl nitrite inhalation.

16. Special care should be taken during an operation on the mouth to prevent any blood flowing down into the larynx. Full anæsthesia may be maintained by introducing chloroform vapour into the post nasal space through a soft catheter connected with the Junker's inhaler ; or by injecting morphine subcutaneously before the inhalation.

17. **Lividity** of the **face** and **deep stertor** should at once be controlled by raising the shoulders, opening the mouth and pulling out the tongue. If breathing threatens to stop or stops altogether, artificial respiration according to Silvester's plan should immediately be commenced, and at the same time the fingers may be thrust under the ribs to mechanically stimulate the heart. Artificial respiration should be main-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

tained, for at least an hour or so, and if there be any sign of returning life, it should be continued for several hours. In addition to the above measures, hypodermic injections of strychnia, ether and brandy, the inhalation of nitrite of amyl, bandaging of the limbs, compression of the abdominal aorta and lowering of the head should all be tried.

Treatment after inhalation.—No food should be given for at least two hours after inhalation. Iced soups or jellies and iced milk with soda-water may be given during the next 12 hours. Vomiting may be checked by the sucking of lumps of ice or by a tea-spoonful of burnt brandy.

Dangers during administration.—Broadly speaking they may arise from two sources; *viz*—(1) failure of respiration, and (2) failure of the heart, as detailed below :—

1. **Death from suffocation** may be caused by—

(*a*) *Obstruction of the glottis* by falling back of the tongue, or the sucking in of vomiting matter of blood.

(*b*) *Spasm of the glottis* from the inhalation of chloroform vapour which is either too strong, or contains irritating products of decomposition.

(*c*) *Mechanical impediments to respiration*, (1) **Constrained position of patient**, as in obstetric and renal operations; (2) **Pressure of tight clothes** or **bandages**, or the **assistant's arms**; (3) **Falling in of the lips and alæ nasi**, as in old people who have lost their teeth; (4) **Spasmodic holding of the breath**, especially in nervous patients and during the early stages of the administration.

(*d*) *Paralysis of the respiratory centre* caused either by the administration of too concentrated vapour, or of chloroform vapour along with carbonic acid, as may occur if the cone be kept too close to the mouth and nose without allowing the ingress of air.

2. **Death from the stoppage of the heart** may occur from—

(*a*) *Excessive concentration of chloroform vapour*, causing sudden paralysis of the cardiac muscle.

(*b*) *The shock of operation*, reflexly stopping the heart. This may happen even in trivial operations especially if anæsthesia be incomplete.

(*c*) *Diseases of the heart.* The heart is apt to fail if it is fatty, dilated, or structurally disorganised. Therefore it is risky to administer chloroform to the old, the infirm, the anæmic, drunkards, epileptics and those who suffer from valvular diseases. For them ether is the safest anæsthetic. A. C. E. mixture or the simultaneous inhalation of oxygen and chloroform vapour may also be resorted to in carefully selected cases. (See p. 207.)

Self-Administration of Chloroform.—Should always be discouraged, but it is occasionally necessary as in cases of difficult labour, where there is no skilled assistance available. A pledget of cotton wool may then be placed in the bottom of a tumbler, and some chloroform poured on to it. This should then be given to the patient with instructions to inhale deeply. No harm can possibly occur because as soon as she begins to lose consciousness she drops the tumbler and the inhalation comes to an end.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

3. All **tight clothes** about the neck, chest and abdomen should be removed or materially loosened. Attendants' or dressers' hands should not press upon the chest or abdomen while holding the patient.

4. Artificial teeth should be removed.

5. The safest position of the patient is the dorsal decubitus.

6. As the **undivided attention** of the chloroformist is essential for the safety of the patient, the operator should not undertake to administer the chloroform and to operate at the same time.

7. Chloroform should be freely diluted, with air.

8. An ordinary handkerchief or a piece of lint folded in the form of an open cone within which some absorbent cotton has been stitched is the best inhaler in the absence of Junker's apparatus which does not allow a greater concentration of chloroform than 5 per cent. If a cone is used it should not be held either too close to, or too distant from, the mouth and the nose. The proper distance throughout the inhalation is the nearest which does not cause choking, struggling or holding of breath.

9. If the patient is weak, a small dose of brandy or whisky may with advantage be given before the inhalation is begun.

10. If lint is used, not more than 20 or 30 m. should be sprinkled on to it at a time. Some anæsthetists prefer to commence with double this dose, so as to lessen the period of excitement.

11. Pay particular **attention** to the breathing, as most of the accidents are caused by respiratory failure. Irregularity of breathing is generally caused by insufficiency of air, which makes the patient struggle or hold his breath.

12. No operation should be commenced until the patient is under **complete anæsthesia**, as shown by the absence of the corneal reflex. The administration should never be pushed to the stage of stertorous breathing and complete relaxation of muscles, except when it is absolutely necessary as for the reduction of old-standing dislocations.

13. Directly the **corneal sensibility** is **lost** or **respiration** becomes **stertorous**, the **inhalation** must be **suspended**. In case the stertor comes on while the cornea is still sensitive, the inhalation should not be proceeded with, as it invariably happens that the cornea becomes insensitive within a few seconds afterwards

14. The patient's head should invariably be turned to one side, the lower jaw depressed and the tongue drawn forward if necessary during vomiting, so that no vomited matter may enter the larynx. Should this accident happen laryngotomy must be at once performed.

15. **Pallor** of the **face** is best controlled by lowering the head and giving amyl nitrite inhalation.

16. Special care should be taken during an operation on the mouth to prevent any blood flowing down into the larynx. Full anæsthesia may be maintained by introducing chloroform vapour into the post nasal space through a soft catheter connected with the Junker's inhaler; or by injecting morphine subcutaneously before the inhalation.

17. **Lividity** of the **face** and **deep stertor** should at once be controlled by raising the shoulders, opening the mouth and pulling out the tongue. If breathing threatens to stop or stops altogether, artificial respiration according to Silvester's plan should immediately be commenced, and at the same time the fingers may be thrust under the ribs to mechanically stimulate the heart. Artificial respiration should be main-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

tained, for at least an hour or so, and if there be any sign of returning life, it should be continued for several hours. In addition to the above measures, hypodermic injections of strychnia, ether and brandy, the inhalation of nitrite of amyl, bandaging of the limbs, compression of the abdominal aorta and lowering of the head should all be tried.

Treatment after inhalation.—No food should be given for at least two hours after inhalation. Iced soups or jellies and iced milk with soda-water may be given during the next 12 hours. Vomiting may be checked by the sucking of lumps of ice or by a tea-spoonful of burnt brandy.

Dangers during administration.—Broadly speaking they may arise from two sources; *viz*—(1) failure of respiration, and (2) failure of the heart, as detailed below :—

1. **Death from suffocation** may be caused by—

(*a*) *Obstruction of the glottis* by falling back of the tongue, or the sucking in of vomiting matter of blood.

(*b*) *Spasm of the glottis* from the inhalation of chloroform vapour which is either too strong, or contains irritating products of decomposition.

(*c*) *Mechanical impediments to respiration*, (1) **Constrained position of patient**, as in obstetric and renal operations; (2) **Pressure of tight clothes** or **bandages**, or the **assistant's arms**; (3) **Falling in of the lips and alæ nasi**, as in old people who have lost their teeth; (4) **Spasmodic holding of the breath**, especially in nervous patients and during the early stages of the administration.

(*d*) *Paralysis of the respiratory centre* caused either by the administration of too concentrated vapour, or of chloroform vapour along with carbonic acid, as may occur if the cone be kept too close to the mouth and nose without allowing the ingress of air.

2. **Death from the stoppage of the heart** may occur from—

(*a*) *Excessive concentration of chloroform vapour*, causing sudden paralysis of the cardiac muscle.

(*b*) *The shock of operation*, reflexly stopping the heart. This may happen even in trivial operations especially if anæsthesia be incomplete.

(*c*) *Diseases of the heart.* The heart is apt to fail if it is fatty, dilated, or structurally disorganised. Therefore it is risky to administer chloroform to the old, the infirm, the anæmic, drunkards, epileptics and those who suffer from valvular diseases. For them ether is the safest anæsthetic. A. C. E. mixture or the simultaneous inhalation of oxygen and chloroform vapour may also be resorted to in carefully selected cases. (See p. 207.)

Self-Administration of Chloroform.—Should always be discouraged, but it is occasionally necessary as in cases of difficult labour, where there is no skilled assistance available. A pledget of cotton wool may then be placed in the bottom of a tumbler, and some chloroform poured on to it. This should then be given to the patient with instructions to inhale deeply. No harm can possibly occur because as soon as she begins to lose consciousness she drops the tumbler and the inhalation comes to an end.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

CHRYSAROBINUM. See p. 247.

CIMICIFUGÆ RHIZOMA.

Cimicifuga. N.O. *Ranunculaceæ.*

Syn. B.P.—Actææ Racemosæ Radix. Black snake-root.

Habitat.—United States, Canada.

Source.—The dried rhizome and roots of *Cimicifuga racemosa.*

Characters.—*Rhizome* 2 to 6 in. long, ½ to 1 in. thick, hard, cylindrical, with remains of stout ascending branches marked with encircling leaf-scars. *Roots* brittle. Odour faint. Taste bitter, acrid.

Composition.—(1) A *Volatile Oil.* (2) *Two Resins.* (3) *Gallic and Tannic Acids. Cimicifugin* is an impure resin precipitated from the tincture.

Action.—Stomachic tonic, cardiac tonic and antirheumatic.

Official Preparations.

1. **Extractum Cimicifugæ Liquidum.**—1 in 1.
B.P. Dose.—5 to 30 ms.
2. **Tinctura Cimicifugæ.**—1 in 10. **B.P. Dose.**—½ to 1 dr.

Pharmacology.

Internally.—It has a peculiar action. In small doses, it is a **stomachic tonic** like the vegetable bitters, and a **cardiac tonic** like digitalis. In large doses, it causes vomiting, it **depresses the heart** like aconite, it **paralyses the sensory** tracts of the cord thereby lowering reflex excitability, and it **increases the bronchial secretion.** It affects the **uterus** like ergot producing rhythmical contractions, and not throwing the organ into a state of tonic spasm.

Therapeutics.

Internally.—It is not much used. As a *stomachic tonic* it may be given in **dyspepsia** accompanied with neuralgic pain. It is very much praised in **chronic rheumatism, lumbago, pleurodynia,** and **chorea** especially when there is also a rheumatic tendency. It is recommended in **irritable** and **fatty heart, dysmenorrhœa, amenorrhœa, headache, sciatica** and **chronic bronchitis.** It is a drug of very doubtful utility and it deteriorates rapidly on keeping.

CINCHONÆ RUBRÆ CORTEX.

Red Cinchona Bark. N.O. *Rubiaceæ.*

Habitat.—South America. Cultivated on the Nilgiris and in Sikkim, Burma, Central India, Ceylon, Java, &c.

Source.—The dried bark of the stem and branches of cultivated plants of *Cinchona Succirubra.*

Besides the official, there are several varieties of bark from which quinine is extracted. About thirteen kinds of cinchona are grown in the Government plantations in India.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—In quilled or incurved pieces, coated with periderm; 2 in. to 1 ft. long, $\frac{1}{16}$ to $\frac{1}{4}$ in. thick; outer surface reddish-brown, rough from longitudinal ridges, transversely cracked and warty; inner surface brick-red, coarsely striated. Fracture shortly fibrous Powder brownish or reddish brown. No odour. Taste bitter, somewhat astringent. *Impurities.*—Barks of inferior quality.

Tests.—It should yield 5 to 6 p. c. of total alkaloids, of which half should consist of quinine and cinchonidine. The process for their estimation is given in the B. P. (which see).

Composition.—The bark contains the following.—

A. *Four important alkaloids.*—(1) *Quinine*, as a hydrate. (2) *Cinchonine.* (3) *Quinidine.* (4) *Cinchonidine*,

B. *Three acids.*—(1) *Chinic* or *Quinic Acid*, closely allied to benzoic acid. (2) *Chinovic Acid.* (3) *Cincho-tannic Acid.*

C. *One glucoside.—Chinovin*, which easily splits up into chinov acid and glucose,

D. *One colouring ingredient.—Cinchona Red*, almost insoluble in water.

E. *One Volatile Oil*, which gives the bark its smell.

Incompatibles.—Ammonia, lime water, metallic salts, and gelatin. In practice it is combined with acids, alkalis, iron and digitalis.

Action.—Bitter tonic, astringent, antiperiodic.

Official Preparations.

1. **Extractum Cinchonæ Liquidum.**—5 grs. of alkaloids in 110 ms. Standardized. A brownish liquid. **B.P. Dose.**—5 to 15 ms.

2. **Infusum Cinchonæ Acidum.**—1 in 20 (1 hour).
B.P. Dose.—½ to 1 oz.

3. **Tinctura Cinchonæ.**—1 gr. of alkaloids in 110 ms. Standardized. Reddish-brown. **B.P. Dose.**—½ to 1 dr.

4. **Tinctura Cinchonæ Composita.**—½ gr. of alkaloids in 110 ms. Standardized. Red. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Decoctum Cinchonæ. B.P. 1885.**—Bark 1¼, Distilled Water *q.s.* to 20. Boil for 10 minutes. *Dose.*—1 to 2 ozs.

2. **Cinchona Febrifuge.**—Prepared and sold by the Government of India. It has an average percentage of crystallisable quinine 15·5, cinchonine 33·5, cinchonidine 29, amorphous alkaloid 17, colouring matter 5. Though a valuable antiperiodic and febrifuge, it causes nausea, vomiting and derangement of bowels.

3. **Cinchonidinæ Sulphas.**—In colourless silky crystals soluble in water. *Dose.*—1 to 10 grs.

4. **Cinchoninæ Sulphas.**—In colourless prismatic crystals soluble in water. *Dose.*—1 to 10 grs.

Pharmacology and Therapeutics.

Internally—Cinchona bark is an **astringent bitter tonic, a febrifuge** and a **mild antiperiodic**, due to the alkaloids and other ingredients it contains. The crude bark irritates the stomach and bowels. It is often prescribed with other vegetable bitters during convalescence from an acute febrile attack, or along with

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

quinine salts to increase their antiperiodic property. On account of its astringent and antiperiodic virtues, it is often used with benefit in **diarrhœa** and **dysentery** accompanied with malarial fever. Combined with Spiritus Ammoniæ Aromaticus, the compound tincture makes an excellent "Pick-me-up." It also checks the craving for strong drinks.

QUININÆ HYDROCHLORIDUM.

Quinine Hydrochloride.

$C_{20}H_{24}N_2O_2$, HCl, $2H_2O$.

Syn. B.P.—Hydrochlorate of Quinine, B.P. 1885.

Source—Obtained from the bark of various species of Cinchona and Remijia.

Characters.—In crystals like those of quinine sulphate, but somewhat larger. *Solubility.*—1 in 35 of cold and freely in boiling water, 1 in 3 of alcohol (90 p.c.)

Action.—Antiperiodic, antipyretic, tonic. B P. Dose.—1 to 10 grs.

OFFICIAL PREPARATIONS.

1. **Tinctura Quininæ.**—2 grs. in 110 ms. B.P. Dose.—½ to 1 dr.
2. **Vinum Quininæ.**—1 gr. in 1 oz. B P. Dose.—½ to 1 oz.

QUININÆ HYDROCHLORIDUM ACIDUM.

$C_{20}H_{24}N_2O_2$, 2HCl, $3H_2O$.

Source.—The same as that of hydrochloride of quinine.

Characters.—A white crystalline powder. *Solubility*—In less than its own weight of water. Reaction acid. B.P. Dose.—1 to 10 grs.

QUININÆ SULPHAS. Quinine Sulphate.

$\{(C_{20}H_{24}N_2O_2)_2, H_2SO_4\}_2, 15H_2O$.

Source—The same as that of quinine hydrochloride.

Characters.—Filiform, silky white crystals; taste intensely bitter. *Solubility.*—1 in 800 of water, giving the solution a bluish fluorescence; entirely in water acidulated with a mineral acid. *Impurities*—Cinchonine, quinidine, cupreine or amorphous alkaloid, lime, chalk, magnesia, starch. It should not yield more than a total of 3 p.c. of cinchonidine.

Cinchonine, quinidine and cupreine are not present in the quinine sulphate of any reliable manufacturer. Cupreine is only present if *cuprea* or *Remijia* bark is used.

Tests.—Aqueous solutions of quinine salts yield with solution of ammonia white precipitates, soluble in ether and in excess of the solution of ammonia. When such aqueous solutions are treated first with solution of bromine or of chlorine and afterwards with solution of ammonia, they become of an emerald-green colour, changing to red when mineral acids are added. Exposed to dry air, quinine sulphate effloresces, until the 15 molecules of water have been reduced to 4. It affords the reactions characteristic of sulphates. 2·5 grammes of freshly prepared salt should lose 38 gramme of water by drying at 212° F. Heated to redness with

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

free access of air, it burns without leaving any residue (absence of mineral impurity).

For tests for *cinchonidine, cinchonine, quinidine, cupreine* and *amorphous alkaloids* see the B P, 1898, p. p. 227—8.

Incompatibles.—Alkalis and their carbonates, astringent infusions.

B.P. Dose.—1 to 10 grs.

Enters into.—The preparation of Ferri et Quin. Citras, Syr. Ferri Phosph. c. Quin. et Strych., and the

Official Preparations.

1. **Pilula Quininæ Sulphatis.**—5 in 6. **B P. Dose.**—2 to 8 grs.
2. **Tinctura Quininæ Ammoniata.**—2 grs. in 110 ms.

B.P. Dose.—½ to 1 dr.

Non-Official Preparations and Derivatives of Quinine.

1. **Quininæ Albuminas.**—54 p. c. of quinine. Amorphous.
2. **Quin. Arsenas.**—*Dose.*—$\frac{1}{10}$ to ¼ gr. in malaria.
3. **Quin. Carbolas.**—A crystalline salt containing 77 p. c. of anhydrous quinine. In diarrhœa. *Dose.*—2 grs.
4. **Quin. Chloras.**—In white needles slightly soluble in water. *Dose.*—1 to 5 grs.
5. **Quin. Citras.**—Like sulphate. *Dose.*—1 to 5 grs.
6. **Quin. Ethylcarbonas.** *Syn.—Euquinine, Euchinine.*—In crystals sparingly soluble in water. An excellent substitute for quinine sulphate. May be given to children in milk or soup as it is not so bitter. *Dose.*—5 to 10 grs.
7. **Quin. Fluoridum.**—Reduces enlarged spleen and fever. *Dose.*—2 to 5 grs.
8. **Quin. Glycerophosphas.**—2 kinds, *viz.*, basic and neutral. In obstinate neuralgia or chronic malaria. *Dose.*—3 to 8 grs.
9. **Quin. Hydrobromidum.**—In white acicular crystals, soluble in water. Used as an antipyretic and antiperiodic. With excess of diluted hydrobromic acid lessens cinchonism. *Dose.*—1 to 5 grs. or more.
10. **Quin. Hydrobrom. Acidum.**—Yellowish crystals, very soluble in water. Used hypodermically. *Dose.*—½ to 2 grs.
11. **Quin. Hydrochloro-Carbamidum.** *Syn.—Urea Quinine.*—Soluble in water. Used hypodermically in cholera in 12 to 15 gr. doses.
12. **Quin. Hydrochloro-Sulphas.**—Soluble 1 in 2 of water. Used for hypodermic purposes. *Dose.*—1 to 10 grs
13. **Quin. Hypophosphis, Quin. Phosphas.**—*Dose.*—1 to 6 grs.
14. **Quin. Iodas, Quin Hydriodum, Quin. Hydriod. Acidum.**—In chronic rheumatism and tubercle. *Dose.*—2 to 5 grs.
15. **Quin. Lactas.**—A granular white amorphous powder soluble in water. Suitable for internal and hypodermic use. *Dose.*—1 to 5 grs.
16. **Quin. Oleatum.**—1 in 3 of Oleic Acid. Readily absorbed when applied externally.
17. **Quin. Salicylas.**—Silky, acicular crystals sparingly soluble in water. In remittent fever, rheumatism, neuralgia and diarrhœa. *Dose.*—2 to 6 grs.
18. **Quin. Sulphas Acida.** *Syn.—Neutral Quinine Sulphate.*—Soluble 1 in 12 of water. For hypodermic injection. *Dose.*—1 to 10 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

19. **Quin. Sulphocarbolas.**—An amorphous white powder. *Dose.*—1 to 6 grs.

20. **Quin. Tannas.**—An amorphous, whitish yellow powder. Not so bitter, suitable for children. In fever with diarrhœa. *Dose.*—1 to 4 grs.

21. **Quin. Tartras.**—Sparingly soluble. Used hypodermically.

22. **Quin. Valerianas.**—In nervous headache and hysteria. *Dose.*—1 to 4 grs.

23. **Quinetum.**—The mixed alkaloids from the East India red cinchona bark. The sulphate is like quinine sulphate. *Dose.*—1 to 10 grs.

24. **Quinoidin.** *Syn.—Chinoidinum.*—A mixture of alkaloids mostly amorphous obtained as a by-product. *Dose.*—1 to 5 grs.

25. **Quinolin.**—Obtained by distilling quinine or cinchonine with aqueous potassium hydroxide, or synthetically. Antiseptic.

26. **Quinosol.** *Syn.—Potassium Oxychinolin Sulphate.*—Antiseptic, disinfectant and deodorant. Acts better in solution than in powder.

27. **Warburg's Tincture.** *Syn.—Tinctura Antiperiodica. B.P.C.*—Take in grains, Aloes Soc. 240, Rhubarb 80, Angelica Fruit (*Archangelica Officinalis*) 80. Elecampane Root (rhizome and root of *Inula Helenium*, Linn.) 40, Saffron 40, Fennel 40, Prepared Chalk 40, Gentian 20, Zedoary Root (root of *Curcuma Zodoaria*) 20, Cubebs 30, Myrrh 20, White Agaric (the white fungus *polyporus officinalis*, Fires) 20, Opium $2\frac{1}{2}$, Black Pepper 4, Cinnamon 8, Ginger 8, Alcohol (60 p. c.), *q. s.* Macerate for seven days in one pint of alcohol, press, filter, and dissolve in the product Quinine Sulphate 175 grs., Camphor 20 grs. After three days filter and add alcohol *q. s.* to 1 pint. *Dose.*—1 to 4 drs.

28. **Saloquinine.**—A Quinine Salicylic acid-ester. A tasteless substitute for quinine. *Dose.*—15 to 45 grs. per diem., as an analgesic: up to 90 grs. per diem in malaria.

PHARMACOLOGY.

Externally.—Quinine sulphate, ordinarily called quinine, is an active poison to many low forms of vegetable and animal life. Even a weak solution of quinine (1 gr. to 1 oz. of water) kills many active infusoria, bacteria and protozoa. According to Binz a solution (1 in 20,000, *i. e.*, 1 gr. in 46 ozs. of water) destroys paramœcia in hay infusions in two hours. In small doses it diminishes and in large doses arrests **fermentation** due to organised ferments, but it has no action on the conversion of sugar by ptyalin or diastase. Hence it is a powerful **antiseptic** and **disinfectant**. It does not affect the healthy skin, but irritates an abraded surface.

Internally. **Mouth.**—It is a pure vegetable **bitter**, and has an intensely persistent bitter taste if taken in neutral or slightly acid solution, as the alkaline saliva precipitates the alkaloid. Like other bitters it **reflexly stimulates the salivary secretion** by exciting the gustatory nerves; but, if it is injected into the duct of the submaxillary gland, it checks its secretion either by paralysing the ends of chorda tympani or the secreting cells. The sympathetic fibres are not affected except in very large doses, consequently the secretion of thick ropy saliva is not prevented.

Stomach and intestine.—All quinine salts are, in the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

stomach, converted into a hydrochloride, which being soluble, is easily absorbed. In small doses (1 to 2 grs.) it is a bitter **stomachic tonic** like calumba (see p. 301), and indirectly it acts as a general and cardiac tonic. In large doses (15 to 40 grs) it produces the opposite effect—depression and gastro-intestinal irritation. It is not easily absorbed from the intestine as it is precipitated by the alkaline succus entericus.

Blood.—After absorption into the blood, quinine has several specific actions which may best be described under the following heads :—

1. *White corpuscles.*—Quinine paralyses the movements of the white blood-corpuscles. This may be seen by mixing a drop of the solution with a drop of fresh blood under a microscope. If quinine be injected into a blood vessel, it at once stops the emigration of the leucocytes ; but it has no effect on the amœboid movements of those which have already passed out into the tissues. This action was at one time considered very important and quinine was regarded as a valuable means of checking the formation of pus : with our present knowledge however of the rôle played by the leucocytes in the process of suppuration it is clear that this action, if it were exerted at all would be the reverse of beneficial as it would interfere with the first line of defence of the organism against bacterial infection. According to Binz, quinine not only checks the movements of the leucocytes ; it actually destroys them.

2. *Red corpuscles.*—These are not materially affected, though many assert that it increases their number and causes an *increase* in their size. In large doses the opposite effect is produced. It is in fact a hæmolytic.

3. *Hæmoglobin.*—The oxyhæmoglobin is made a stable compound, consequently the blood cannot either absorb or give up oxygen so readily as in health. Probably this does not occur in medicinal doses.

4. *The oxidising power* of the blood is considerably affected as will be evident from the following experiment. If tincture of guaiacum be added to ozonic ether (a solution of hydrogen peroxide in ether), no blue colour appears, because guaiacum resin has not sufficient affinity for oxygen, but the addition of a drop of blood to this mixture gives a blue colour at once, indicating that blood has the power of taking up oxygen from the ozonic ether and of transferring it to the guaiacum. Quinine added to the blood checks this oxidising influence.

5. *Acidity of blood.*—Ordinarily fresh drawn blood turns acid after a while, but the addition of quinine checks this change.

6. *The malarial parasite.*—Under the administration of quinine malarial parasites (*plasmodium malariæ*) disappear from the peripheral circulation. This action is exercised at the moment when, as the result of sporulation the young parasites are set

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

free in the blood plasma, and it has probably very little power of destroying *crescent forms*. The utility of quinine in arresting malarial fever is therefore due to its acting as a protoplasmic poison to the plasmodium and not to its action on the leucocytes.

Heart and Circulation.—Small doses **reflexly stimulate** the heart through the stomach, but large doses **directly paralyse** it; the pulse becomes slow and feeble, and at last the heart **stops in diastole**. It is not definitely known whether this action is due to its influence on the muscular fibres or on the motor ganglia of the heart. The blood-pressure is increased by small doses, and is very much lowered by larger doses, owing to its depressing influence on the heart and on the vaso-motor centre.

Respiration.—It is not affected by small doses, but is quickened by moderate doses, and in toxic doses it is first slowed then arrested. The gaseous interchanges are checked.

Liver and Spleen.—It has no action on the liver, but **contracts** the recently **enlarged spleen**. The writer has often observed this, even when the fever is not checked by the drug. On chronic hypertrophy of the spleen it has no effect.

Temperature.—Quinine has very little effect upon the temperature in health, but causes a marked reduction in fevers, particularly if they are of malarial origin. It is therefore an **antipyretic** on account of (1) diminished oxidation, (2) lessened tissue metamorphosis, and (3) its specific action on the malarial parasites.

Nervous system.—Small doses have a tonic effect upon the nervous system, but large doses produce a train of symptoms known as **cinchonism** (*q. v.*).

Cerebrum.—Small doses stimulate and large doses depress the functions of the brain. Sometimes the motor centres are excited, causing epileptic fits.

Cord and *nerves.*—Quinine does not affect the functions of the cord and nerves in man, though it reduces reflex activity in frogs.

Uterus.—Quinine occasionally acts as an **ecbolic**, and it certainly intensifies the labour pains or re establishes them if they are absent, when parturition has already commenced. The notion that the administration of quinine in pregnancey is highly dangerous is a mistake. Very large doses are frequently taken without causing any ill effects. Indeed one often sees abortion result from an unchecked fever, which might have been avoided by the timely administration of quinine.

Urinary tract.—Quinine is excreted by the kidneys very slowly, continuing for several days, though rapidly during the first forty-eight hours. The amount of nitrogenous products, such as urea, uric acid, &c., is diminished. In many cases it irritates the bladder and the urethra.

Skin.—It escapes, though slightly, through the skin and does

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

not seem to increase the perspiration, except in malarial pyrexia. It produces papular, erythematous and scarlatiniform rashes (see p. 150).

Elimination.—It is eliminated with the urine, sweat, milk, saliva, bile, tears, dropsical fluid and fæces.

Toleration.—Some persons are very susceptible to the action of this drug. Even a small dose may produce cinchonism particularly headache and ringing in the ears. The writer has seen a female who became collapsed after taking 5 grs. of quinine sulphate (See p. 105).

Cinchonism.—A single large dose (20 grs.) or small doses frequently repeated cause ringing in the ears, frontal headache, slight deafness and dimness of vision. In larger doses these symptoms are intensified, with the addition of staggering gait, and muscular and cardiac weakness.

Acute toxic action.—It is rarely taken as a poison. If it is, the above symptoms are further intensified. The patient becomes deaf, blind, delirious and collapsed, and may die either from cardiac or respiratory failure, or from convulsions.

THERAPEUTICS.

Externally.—Quinine cannot be freely used on account of its cost, though it is a *powerful antiseptic.* A lotion (2 to 4 grs. in 1 oz. of water) has been found very efficacious **in diphtheritic conjunctivitis,** and as an injection in **hay fever, otorrhœa,** and **chronic cystitis.** A diluted solution preserves meat, milk, butter, urine, &c.

Internally.—As an *antiseptic* it may be used as a gargle in **stomatitis, diphtheritic ulceration** and **sorethroat.**

As a *stomachic tonic* it is very useful in convalescence from an acute illness, particularly malarial fever. Its efficacy is considerably increased if it is combined with mineral acids and other bitters.

As an *antipyretic* it is far inferior to phenazone, phenacetin, acetanilide or sodium salicylate, but there are many who advocate its use in 10 to 20 grs doses in **typhus, typhoid** and **puerperal fever, acute rheumatism, insolation** and **pyæmia.** It must be given just before the natural defervescence. It is useless in hyperpyrexia.

As an *antiperiodic* and *febrifuge* it is considered almost a specific for **ague, malarial fever** and all **intermittent** and **remittent affections.** A few of them require more than a passing notice—

(1) *Ague.*—Being a direct poison to the malarial parasite, quinine acts as a specific in ague. A single large dose of 10 to 20 grs. should be given at least two hours before the expected paroxysm. It will then have been absorbed into the blood before sporulation takes place and will thus quickly attack the young spores when they are discharged into the plasma and before they are able to enter into the red corpuscles. An emetic or a cholagogue pur-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

gative, preferably the latter, should be given before the administration of quinine. The administration of repeated small doses is the customary plan in this country, but the writer considers a single large dose of 10 grs. two hours before a fit, and 3 or 4 small doses during intermission are more efficient in many cases than small doses alone. In many obstinate cases, he gives two large doses, one at the beginning of defervescence and the other two hours before the expected fit. It is useless to administer the powdered drug in excessively large doses as it is not absorbed. In fact quinine should always be given in solution and never in the form of pills or tabloids. In whichever way it is given, it should be continued as a *prophylactic* for some times in 2 to 5 grs. doses three times a day. Some advocate a large dose (15 grs.) every fifth or sixth day for this purpose.

(2) *Enlargement of the spleen.*—With the cure of ague the size of the spleen is reduced, but the efficacy of quinine is greatly augmented if it is given with iron as in the following prescription :—Quin. Sulph. 2 grs., Ferri Sulph. ½ gr., Pulv. Rhei 5 grs, Pulv. Ipecac ⅙ gr., Pulv. Zingib. 2½ grs. and Sod. Bicarb. 2½ grs. M., T. D. In a recently enlarged spleen, with or without ague, the writer uses this formula with marked success. Fluoride of quinine may sometimes reduce chronic hypertrophy of the spleen.

(3) *Malarial remittent* and *malarial continued fevers* usually run a definite course, but their intensity and progress may be controlled by the judicious use of quinine. The writer always administers either the salicylate or the hydrobromide in 3 to 5 gr. doses twice or thrice daily during remission in remittents, and without any reference to temperature in continued fevers. But as soon as the intermission is obtained, he gives quinine with bark and stimulants. In these fevers it is a mistake to give quinine in antipyretic doses, for it only depresses the heart without affecting materially the temperature.

(4) *Malignant forms of ague* or *pernicious malarial fever.*—Many deaths occur from this type of fever, either from ignorance or from want of courage on the part of the physician to administer quinine in sufficiently large doses. From the beginning without any reference to temperature or local symptoms, with stimulants if necessary, quinine must be given in 20, 30, or 40 gr. doses either by the mouth or by the rectum. Hypodermic or intravenous injection sometimes succeeds well.

(5) *Kala Azar.*—Which was formerly supposed to be a pernicious type of malarious fever, is now known to be due to the Leishman-Donovan body, a parasite which Rogers has shown to be a phase in the life history of a trypanosome. Quinine is useless in this disease.

In the *so called Malarious Cachexias* especially those of *the hæmorrhagic type*, quinine is worse than useless : it is an actual poison. This is what we would expect when one remembers that

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

it is both a leucocyte poison and a hæmolytic. In all these cachexias there is a marked leucopenia, and therefore quinine must be harmful. Koch indeed goes so far as to say that "Black-water fever" *i.e.*, fever with hæmoglobinuria is merely quinine poisoning, and the editor's experience entirely bears out the truth of this view.

(6) *Intermittent* or *remittent neuralgias*, such as **brow-ague, faceache** or **headache** of malarial or non-malarial origin, often yield to quinine.

As a *prophylactic* against **ague** and other **malarial affections** it has been found very effective, but we cannot define the period during which we should continue it for relapses have taken place after one, two or more years ; even when the patient has been removed from an infected place and has had no chance of a fresh infection. By cinchonising its inhabitants we can markedly lessen the malarious fever of a district, but it is not possible to adopt this measure on a large scale.

As an *ecbolic* it is always prescribed in place of ergot during **labour**, if there is no obstruction. Ten grains followed by a similar dose after one or two hours often strengthen weak pains.

As a *nervine tonic* it has been used with great benefit in a host of nervous diseases, generally in combination with iron and strychnine, as Easton's Syrup.

Besides the diseases already mentioned, quinine may be given in **acute catarrh, influenza, hay fever, croup, diphtheria, pneumonia, passive hæmorrhage, lumbago, sciatica, septicæmia** and **catheter-fever.**

Caution.—It should be avoided or given very cautiously in acute or subacute diseases of the middle ear, gastro-enteritis, extreme anæmia, active cerebral congestion, skin eruptions, such as erythema, urticaria, &c., and to persons particularly susceptible to its influence.

Prescribing hints.—It should always be given in solution and never in the form of pills or tabloids. Mineral acids (1 m. to each grain, see p. 83) and tincture of ferric chloride dissolve the sulphate, but unless an excess of acid is used, it will leave a peristently bitter after-taste. To avoid this it may as well be given in an effervescing form dissolved in citric acid, or simply suspended in water. To diminish cinchonism the Sulphate may be dissolved by the aid of dilute hydrobromic acid in the proportion of 2 m. of the acid for each grain of quinine. Too large doses of hydrobromic acid however are apt to cause diarrhœa. The after-taste of quinine is soon removed or not perceived at all if the patient swallows a little water after taking the drug, and chews a few bits of betel-nut, myrobalan (*haritaki*), unripe guava, or any other substances containing tannin. Being almost tasteless, euquinine is suitable for administration to children (see p. 117).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

If there is much *gastric irritability*, any of the soluble neutral or acid salts may be given hypodermically, or in their absence the sulphate may be used as an enema or may be given with opium. The intravenous injection should be resorted to only in cases of extreme urgency. The antiperiodic virtue of quinine is greatly enhanced if we combine with it the preparations of cinchona (see p. 110), opium, Indian hemp, arsenic, &c. In many obstinate malarious fevers, Warburg's tincture may be employed with great benefit, but it should be used with caution, as it causes copious perspiration, fall of temperature and weakness and slowing of the heart.

The strictest asepsis must be maintained when giving hypodermic injections of quinine. Several regrettable cases are on record where tetanus has resulted from want of proper care in this respect.

CINNAMOMI CORTEX.

Cinnamon Bark. N.O. *Laurineæ.*

Syn I.V.—*Dálchini*, Beng., and Hind. *Gudatvak*, Sans.

Habitat.—Ceylon. Known as Ceylon cinnamon in commerce.

Source.—The dried inner bark of shoots from the truncated stocks of *Cinnamomum Zeylanicum*. Obtained from cultivated trees.

Characters.—In rolled quills; thin, brittle, splintery, light yellowish-brown; ⅛ in. in diameter. Odour fragrant. Taste warm, sweet, aromatic. *Impurity.*—Cassia bark.

Identification.—It resembles cassia bark, which is coarser, thicker and less aromatic.

Composition.—(1) *Volatile Oil (off.).* (2) *Tannin.* (3) *Sugar.* (4) *Gum.*

Action.—Aromatic stimulant, astringent. *Dose.*—10 to 60 grs.

Enters into—Decoc. Hæmatoxyl., Pulv. Catechu Co, Pulv. Cretæ Arom., Pulv. Kino Co., Tr. Card. Co., Tr. Catechu Co., Tr. Lavand. Co. and the

Official Preparations.

1. **Aqua Cinnamomi.**—1 in 10 *Enters into.*—Chalk, Guaiacum, Castor Oil and Brandy Mixtures, and Aromatic and Aromatic Cascara Syrups. *Dose.*—1 to 2 ozs.

2. **Pulv. Cinnamomi Compositus.** *Syn. B.P.—Pulv. Aromat.*—1 in 3. B.P. Dose—10 to 40 grs. *Enters into.*—Pil. Aloes et Ferri and Pil. Cambog. Co.

3. **Tinctura Cinnamomi.**—1 in 5. B.P. Dose.—½ to 1 dr.

OLEUM CINNAMOMI. Oil of Cinnamon.

Source.—The oil distilled from cinnamon bark.

Characters.—Yellowish when fresh becoming reddish gradually. *Sinks in water. Solubility.*—1 in 10 of alcohol. *Impurities.*—Cinnamon-leaf-oil and cassia-oil.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Composition.—(1) *Cinnamic Aldehyde.* (2) *A Terpene.* (3) *Eugenol.*
Action.—Aromatic stimulant, antiseptic. **B P. Dose.**—½ to 3 ms.

OFFICIAL PREPARATION.

1. **Spiritus Cinnamomi.**—1 in 10. **B.P. Dose.**—5 to 20 ms. *Enters into.*—Acid. Sulph. Aromat.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—The actions and uses of cinnamon bark and its oil resemble those of cloves and the oil of cloves (*q. v*) but the bark has besides a mild **astringent** property. As a flavouring and correcting agent both the bark and the oil are used. In **acute dysentery** the bark has been found useful in 60 to 90 gr. doses twice daily Dr. Drummond has obtained good results from the decoction. The writer has found the bark useful in **mucous diarrhœa.**

CISSAMPELOS.

Cissampelos. N.O. *Menispermaceæ.*

(Ind. and Col. Addendum.)

Syn.—False Pareira Brava. **Syn. I.V.**—*Nimuka*, Beng. *Akndi Nirbisi*, Hind.
Habitat.—India, Eastern Colonies.
Source.—The dried root of *Cissampelos Pareira.*
Characters.—In compressed, undulating pieces, ½ in. in diameter, covered with dark brown bark, with longitudinal furrows and transverse cracks. No odour. Taste bitter.
Composition.—The same as that of the true Pareira (*q. v.*).
Action.—Tonic, diuretic.

OFFICIAL PREPARATIONS.

1. **Decoctum Cissampeli.**—Root 2½ ozs. Water *q. s.* Boil for 15 minutes to 1 pint. **B.P Dose.**—½ to 2 ozs.
2. **Extractum Cissampeli Liquidum.**—1 in 1. **B.P. Dose.**—½ to 2 drs.

PHARMACOLOGY AND THERAPEUTICS.

Its actions and uses are identical with those of the true Pareira root (which see).

COCÆ FOLIA.

Coca Leaves. N.O. *Lineæ.*

Habitat.—Peru, Bolivia.
Source.—The dried leaves of *Erythroxylum Coca* and its varieties.
Characters.—The *leaves* from *Bolivia* 1½ to 3 in. long, 1 to 1½ in. broad, brownish-green, oval, entire, glabrous; upper surface bears a ridge above midrib; on the under surface near to the midrib on

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

either side is a curved line. The midrib is prolonged to a horny apiculus. Odour characteristic. Taste bitter followed by a sensation of numbness. Should be *free from mildew*. The *Peru leaves* are somewhat smaller narrower and do not exhibit a prominent ridge or curved lines.

Identification.—The general appearance, the size, the ridge and the curved lines distinguish it from Senna, Jaborandi and Digitalis leaves.

Composition.—Three alkaloids,—(1) *Cocaine* (*off.*) 0·2 p.c., (2) *Cocamine*, and (3) *Cinnamyl-cocaine*. (4) *Coca-tannin*. (5) *Coca-wax*. The strength varies. . Fresh specimens are the strongest.

Incompatibles.—Mineral acids which decompose cocaine into benzoic acid and ecgonine, mercurial salts, silver nitrate, menthol, and sodium bromide.

Action.—Stimulant, tonic, restorative. *Dose.*—½ to 2 drs.

Official Preparation.

1. **Extractum Cocæ Liquidum.**—1 in 1. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Elixir Cocæ.**—1 in 6 of simple elixir. Very palatable. *Dose.*—1 to 4 drs.
2. **Infusum Cocæ.**—1 in 50 of boiling water. A refreshing beverage.
3. **Vinum Cocæ.**—1 in 8 of sherry. Checks vomiting. *Dose.*—¼ to ½ oz.

Pharmacology.

Internally.—The leaves have the taste and flavour of green tea. They are a **respiratory** and **cerebral stimulant**, and a **nervine** and **muscular tonic**. They seem to appease hunger and thirst and relieve fatigue, and, in large doses, cause insomnia.

Therapeutics.

Internally.—The natives of the country where the plant grows, chew its leaves in the day so that they may defer their eating till the evening. The leaves have been found useful in **dyspepsia, gastralgia, gastrodynia, vomiting** or **discomfort** caused by **heavy eating** or **drinking**. The liquid extract is useful for checking the craving for morphia or alcohol.

COCAINA.

Cocaine. $C_{17}H_{21}NO_4$.

Source.—An alkaloid obtained from Coca leaves.

Characters.—Colourless, monoclinic prisms with a bitter taste followed by tingling and numbness. *Solubility.*—Insoluble in water and glycerin, 1 in 10 of alcohol (90 p.c.), 1 in 4 of ether, 2 in 1 of chloroform, 1 in 4 of oleic acid, 1 in 12 of olive oil. *Impurities.*—Sulphates, chlorides. *Dose.*—$\frac{1}{10}$ to ½ gr. in pill.

Official Preparation.

1. **Unguentum Cocainæ.**—1 in 25.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

COCAINÆ HYDROCHLORIDUM.

Cocaine Hydrochloride. $C_{17}H_{21}NO_4$, HCl.

Syn. B P.—Hydrochlorate of Cocaine.

Source.—The hydrochloride of an alkaloid obtained from coca leaves.

Characters.—In colourless, acicular crystals or crystalline powder. Taste bitter. *Solubility.*—2 in 1 of water, 1 in 4 of alcohol (90 p.c.), 1 in 4 of glycerin. *Impurities.*—Other alkaloids of coca leaves.

Tests for Purity.—(1) Dissolve 1 gr. of the salt in water 2 ozs., add 3 drops of solution of ammonia B.P., when a crystalline precipitate (amorphous alkaloid) will fall down on stirring. (2) Add ½ c.c. of $\frac{1}{10}$ p.c. solution of potassium permanganate to $\frac{1}{10}$ gramme of cocaine salt dissolved in 5 c.c. of water acidified with H_2SO_4. The colour should not disappear within an hour.

Action.—Locally anæsthetic, mydriatic. **B.P. Dose.**—$\frac{1}{6}$ to ½ gr.

Official Preparations.

1. **Injectio Cocainæ Hypodermica.**—10 grs. in 110 ms.
B.P. Dose:—2 to 5 ms.
2. **Lamellæ Cocainæ.**—$\frac{1}{10}$ gr in each.
3. **Trochiscus Krameriæ et Cocainæ.**—$\frac{1}{10}$ gr. in each. A local astringent and anæsthetic *Dose.*—3 to 6.

Non-Official Preparations and Derivatives of Cocaine.

1. **Cocaine-Bougies, Pessaries and Suppositories.**—½ gr. in each.
2. **Ceratum Cocainæ.**—1 to 30 with petroleum cerate. In burns, scalds, pruritus, urticaria.
3. **Collodium Cocainæ.**—2 p.c. in collodium flexile. In inflamed chilblains.
4. **Empl. Cocainæ.**—1 in 50 of lead-plaster. In neuralgia, tender corns and bruises.
5. **Nebula Cocainæ Oleosa.**—2 p. c. in almond oil. In earache.
6. **Pastillus Cocain. Hyd.**—$\frac{1}{10}$ gr. in each.
7. **Cocainæ Citras.**—Deliqueseent crystals. Used by dentists. *Dose.*—$\frac{1}{10}$ to ½ gr.
8. **Cocainæ Hydrobromidum.**—Stable, acicular, white. *Dose.*—$\frac{1}{10}$ to ½ gr.
9. **Cocainæ Nitras.**—Colourless, soluble in water. Is compatible with silver nitrate, and lessens pain of silver applications. *Dose.*—$\frac{1}{10}$ to ½ gr.
10. **Cocainæ Salicylas.**—Deliquescent, granular, white. *Dose.*—$\frac{1}{10}$ to ½ gr.
11. **Cocainæ Sulphas.**—Deliquescent, granular, white. *Dose.*—$\frac{1}{10}$ to ½ gr.
12. **Eucaine Hydrochloride B.** *Syn.*—*B. Eucaine.*—The hydrochloride of Benzoyl-vinyl-diaceton-alkamine In small white opaque crystals, soluble about 1 in 30 of water. Eucaine is slower in its action than cocaine, but it is more reliable and 3 times less toxic. Solutions of double the strength of cocaine are necessary but anæsthesia is more

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

prolonged, and there is no weakening of the heart or dilatation of the pupils.

13. **Holocaine Hydrochloride.**—A synthetic compound in colourless shining crystals, soluble in 1 in 100 of water. Anæsthetic, but toxic.

14. **Orthoform "New."** *Syn.—Methyl ester of Meta-amido-para-oxy-benzoic acid.*—In white crystals. Locally anæsthetic and antiseptic. Its **hydrochloride** is soluble 1 in 9 of water, but is acid and irritating. Recommended as a local anæsthetic in operations within uterus.

15. **Nirvanin.** *Syn.—Hydrochloride of Diethyl-glycocoll-para-amido-ortho-oxybenzoic-methyl ester.*—In white prisms soluble in water. A local anæsthetic and antiseptic. Effects are more prolonged.

16. **Tropacocaine.** *Syn.—Benzoil-pseudo tropeine.*—Obtained from Java coca. Is alleged to be safer, more rapid, and less irritating to the eye without dilating its pupil. Its **Hydrochloride** is freely soluble in water. Very costly.

17. **Cocainæ Hydriodum.**—Hard, colourless crystals, slightly soluble in water. Used in dentistry. *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ gr.

18. **Cocainæ Periodum.**—Violet black crystals. Has been tried for the vomiting of pregnancy. *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ gr.

19. **Cocainæ Phenas.**—A pasty compound used by dentists and has been given for gastralgia. *Dose.*—$\frac{1}{10}$ to $\frac{1}{2}$ gr. (in pill).

20. **Acoine** *Syn.—Di-para-anisyl-mono-phenethyl-guanidine hydrochloride.*—A white crystalline powder. A 2 p. c. solution in normal saline used in dentistry.

21. **Anæsthesine.** *Syn.—Ethylester of para-amido-Benzoic Acid.*—In dyspepsia. *Dose.*—5 to 10 grs. (in cachets.)

PHARMACOLOGY.

Externally.—Cocaine hydrochloride is the strongest and the most soluble of all preparations. It has no action on the unbroken skin. Applied to the mucous membrane it causes **blanching** probably from the constriction of the local blood-vessels, and **anæsthesia** from the paralysis of the periphery of the sensory nerves. Injected subcutaneously it deadens the sensibility and reddens the part around the puncture. These effects may be produced by a 5 to 10 p. c. solution, but they do not last long.

Internally. **Mouth.**—Locally applied it abolishes the sensibility and taste of the tongue, and the sensibility of the palate and fauces. It diminishes the salivary secretion. A 50 p. c. solution annuls the sensibility of the gums

Stomach and intestine.—In very minute doses it acts as a **stomachic tonic**, and in moderate doses diminishes the flow of the gastric juice, and deadens the sensation of hunger and of pain, if present. In large doses it checks peristaltic action, causing either diarrhœa or costiveness.

Heart and circulation.—In moderate doses it increases the frequency of the pulse and raises the blood-pressure, and in large doses it diminishes both The first effect is due to depression, and the second to stimulation of the vagus.

Respiratory tract.—Topically applied it deadens the sensi-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

bility of the nasal mucous membrane. Given internally it first increases the respiratory movements from the stimulation of the respiratory centre, but soon depresses them. Death results from **asphyxia.**

Nervous system. *Cerebrum.*—It acts like caffeine on the nerve centres but more powerfully, producing a feeling of comfort and ease with the abolition of mental and bodily fatigue. Often it causes **sleeplessness** though without much discomfort. In large doses it depresses the nerve centres, affecting first the cerebrum, then the bulb and lastly the cord. By directly applying the drug to the psychomotor centres, Tumas lowered their excitability, and by painting it over the cerebral cortex, prevented convulsions.

Spinal Cord.—Large doses not only paralyse the terminations of the sensory nerves, but affect also the conducting power of the cord, both sensory and motor, but more powerfully that of the sensory tracts. By directly applying cocaine to the sciatic nerve of a frog, Dr. Koch prevented the transmission of the sensory stimuli and after repeated applications that of the motor stimuli also. The muscular work is increased but we do not know how this is effected.

Eye.—A 4 p.c. solution dropped into the eye causes complete **anæsthesia** of the **conjunctiva** and **cornea**, and partial anæsthesia of the **iris.** It **dilates** the **pupil** as widely as atropine (see p. 162), slightly **lowers** the **ocular tension** and partially **impairs** the range of **accommodation,** the latter effects being only transitory. These effects are caused by stimulation of the **sympathetic,** and as they are more quickly produced when the drug is applied topically than when taken by the mouth, they appear to be due to direct local action.

Metabolism is not much altered. The **temperature** rises in cocaine poisoning.

Kidneys and **Sexual Organs.**—It is eliminated in the urine, the quantity of which is said to be increased. Sexual excitability is diminished.

Acute toxic action.—Acute poisoning is not infrequent. Toxic symptoms have been produced from a hypodermic injection of ½ gr. Waking hallucinations like those in poisoning by Indian hemp, leading sometimes to mania, vertigo, respiratory and cardiac difficulty, cramps in the limbs, inability to move and a sensation of foreign bodies, such as pebbles or worms especially the latter moving under the skin, are characteristic.

Antidotes.—Emetics, or pump, if necessary. Amyl nitrite, nitroglycerin, ammonia, strong coffee by the mouth or rectum, strychnine and ether hypodermically.

Chronic toxic action or **"Cocainism."**—Like coca-craving cocainomania is developed either in shaking off the morphine or alcohol habit or from the temporary use of cocaine as a stimulant. Disordered digestion, emaciation, giddiness, quick pulse, insomnia, visual or other hallucinations, amnesia and impotence are prominent symptoms. Habitues

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

may consume up to 10 or sometimes 20 to 30 grs. Total abstinence from the drug, strong coffee, nux vomica and other tonics, change of air, &c., remove this pernicious habit.

Cocainomania is rapidly increasing in Bengal. Cocaine is usually taken with *prepared pan*. The black colouring of the teeth observed by Dr Buchanan is rather due to the constant chewing of the *pan* than to the use of the drug.

THERAPEUTICS.

Externally.—Cocaine is chiefly used as a *local anæsthetic* in the following diseases :—

Eye.—A 4 p.c. solution or the official lamels dropped on the conjunctiva every 3 minutes 3 to 5 times, so far removes the sensibility as to enable the surgeon to perform many **operations**, as for example, **cataract**, &c., painlessly. Where **iridectomy** is necessary, a drop of the solution should be applied to the exposed iris immediately before making the section. **Photophobia**, conjunctival and corneal **pain** are soon relieved by the same collyrium. Combined with Liq. atrop. sulph., cocaine has been found very efficacious in **iritis** and in many painful inflammatory affections of the cornea. By adding ½ gr. of pilocarpine nitrate to 1 dr. of a 4 p.c. solution, we may anæsthetise the eye without affecting the accommodation.

Nose, ear, anus, vagina, &c.—A 5 to 10 p.c. solution removes the sensibility of the mucous membrane of the nose, internal meatus of the ear, vagina, os uteri, urethra and rectum, so as to allow small operations to be performed painlessly. The nasal irritation in **hay fever**, **anal** and **labial pruritus**, **earache**, and the pain of **anal fissure** or **ulcer** are all relieved by the topical application of cocaine.

Skin.—Although cocaine is known not to be absorbed by the intact skin, yet the application of the alkaloid combined with lard or oil allays the burning and pain of **eczema**, **erysipelas**, **urticaria**, **sore-nipples**, &c. The pain and irritation of **burns** and **scalds** are soon relieved, if the part is first brushed over with a 4 p.c. aqueous solution of cocaine hydrochloride and then the pure alkaloid combined either with carron oil or with paraffin or boric acid ointment is applied. A hypodermic injection of cocaine acts like a charm in removing the pain of **scorpion stings**. **Buboes**, **small tumours**, **inflamed bursæ**, small **abscesses** may be painlessly dealt with after injections of cocaine in their neighbourhood. Many superficial **neuralgias** may be quickly relieved by the local application of the alkaloid in oil of cloves, and **sciatica** by the injection of an aqueous solution into the sheath of the nerve.

Intraspinal and Local Infiltration Anæsthesia.—*Intraspinal anæsthesia* by means of cocaine solutions, introduced by Lumbar Puncture, was at one time advocated for the performance of certain minor operations, but it has now been practically

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

abandoned, as it is found that the death-rate is actually higher than after chloroform or ether anæsthesia.

Anæsthesia by the local infiltration method consists in subcutaneous injection of either cocaine or eucaine along the proposed lines of incision and then into the deeper parts before cutting them. The anæsthesia may be prolonged by applying an Esmarch's bandage when possible above the line of incision. This also checks the tendency to the production of toxic symptoms by absorption. Recently adrenalin chloride has been added to the solution with the view of checking hæmorrhage, but it has been found to increase the risk of local sloughing. Nowadays cocaine is rarely used for this purpose, as eucaine gives so much more satisfactory results. The solution used is B. Eucaine 3 grs., Sodium Chloride 12 grs., Distilled water 3½ ozs. It must be sterilised by boiling immediately before use, and either half or the whole of the solution may be used according to the severity of the operation.

Internally. **Gums** and **teeth.**—Cocaine, preferably the alkaloid as it is less likely to be washed away by the saliva, is largely employed in dentistry to deaden the sensibility of the exposed pulp. Cocaine hydrochloride 1, chloral hyd. 5, and camphor 5, form an oily liquid when warmed, which wonderfully removes **toothache.** A tooth may be painlessly extracted by injecting a solution into the gums at its base but this is a risky proceeding. The mere rubbing of cocaine over the gums deadens their sensibility to such an extent as to annul the pain of the first application of the forceps.

Throat and **larynx.**—By applying a 20 p c. solution to the soft palate and pharynx, **enlarged tonsils** or **small growths** in those parts, may be excised, or the galvano-cautery applied painlessly. By the same method the larynx may be explored and minor operations performed there without spasm or pain. In painful **sore throat** cocaine and rhatany lozenges are an excellent local application.

Stomach.—For its local effects on the gastric mucous membrane, it may sometimes be used in **sea-sickness** and **vomiting of pregnancy.** ⅛ gr. with 10 or 15 ms. of tincture of belladonna is often sufficient for this purpose.

As a restorative or respiratory stimulant it is rarely used. In **pertussis** of infants it is given in $\frac{1}{10}$ gr. doses three times a day.

Prescribing hints.—An aqueous solution of cocaine requires a preservative such as salicylic acid to prevent the growth of fungi, which have been found in old solutions, and to which have been attributed many untoward effects, such as sudden fainting, &c. Not more than ¼ gr. cocaine should be injected hypodermically at once. Precautions should be taken to prevent its indiscriminate use and the formation of a cocaine habit. A solution of cocaine should not be used as a spray for fear of poisoning from absorption by the lungs, and it should never be injected into either the gums or the cervix uteri.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

COCCUS. Cochineal.

N.O. *Hemiptera.*

Syn. I.V.—*Crimidáná, Cringdáná,* Beng. Hind.

Habitat.—Mexico, Teneriffe, Rajputana, Southern India.

Source.—The dried fecundated female insect *Coccus cacti* reared on *Nopalea coccinellifera* (N.O. *Cacteæ.*) and other species of *Nopalea.*

Characters.—Oval, flat or concave beneath, convex above, transversely wrinkled, purplish-black or purplish-grey, easily powdered. Powder dark red or puce-coloured.

The insect is ash-grey with a silvery surface when dried in the sun, reddish when killed by immersion in boiling water, and black when dried by artificial heat.

Composition.—(1) *Carminic Acid,* a glucoside. *Carmine* is precipitated from the decoction by sulphuric acid and other reagents.

Enters into.—Tr. Card. Co., Tr. Cinchon. Co. and the

Official Preparation.

1. **Tinctura Cocci.**—1 in to. **B.P. Dose.**—5 to 15 ms.

Uses.

Cochineal is used as a colouring agent. Alkalis turn carmine purple.

CODEINA. See Opium.

COLCHICI CORMUS.

Colchicum Corm. N.O. *Liliaceæ.*

Habitat.—British Isles.

Source.—The fresh corm of *Colchicum autumnale,* collected in early summer; and the same stripped of its coats, sliced transversely and dried at a temperature not exceeding 150° F.

Characters.—*Fresh corm,*—1½ in. long, 1 in. broad, conical, hollowed on one side where it has a new corm in process of development, rounded on the other; outer coat thin, brown, membranous; inner coat reddish-yellow. Internally white, solid, yielding bitter disagreeable milky juice. *Dried slices,*—$\frac{1}{10}$ to $\frac{1}{3}$ in. thick, yellowish at circumference, reniform, firm, whitish, amylaceous. Taste bitter. No odour.

Identification.—The *reniform* appearance is characteristic, though not well marked in some specimens. Squill and tragacanth are not reniform and have special characters (*q v.*).

Composition.—(1) *Colchicine,* 0·5 p.c., an active alkaloid. (2) *Veratrine,* a trace with gallic acid. (3) A *Fixed Oil.* (4) *Gum, Sugar, Starch,* &c.

Incompatibles.—Astringent preparations, tincture of iodine and guaiacum.

Action.—Diuretic, purgative. **B.P. Dose.**—2 to 5 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparations.

1. **Extractum Colchici.**—10 yield 4. **B.P. Dose.**—¼ to 1 gr.
2. **Vinum Colchici.**—1 in 5. **B.P. Dose.**—10 to 30 ms.

COLCHICI SEMINA.

Colchicum Seeds.

Source.—The dried ripe seeds of *Colchicum autumnale*.

Characters.—$\frac{1}{10}$ in. in diameter, subglobular, slightly pointed, rough, reddish-brown, hard, tough, minutely pitted. Endosperm oily. Taste acrid, bitter. No odour.

Identification.—Resemble black mustard seeds, which are smooth and smaller.

Composition.—(1) *Colchicine*, 0.6 to 1.0 p. c. (2) An additional *Volatile Oil*, besides the other ingredients as in the corm

Official Preparation.

1. **Tinctura Colchici Seminum.**—1 in 5. **B.P. Dose.**—5 to 15 ms.

Non-Official Preparations.

1. **Colchicine.**—A yellowish powder. *Dose.*—$\frac{1}{30}$ to $\frac{1}{10}$ gr.
2. **Colchicine Salicylate.** *Syn.*—*Colchi-sal.*—A yellowish powder soluble in water. *Dose.*—$\frac{1}{10}$ gr.

Pharmacology.

Externally.—Locally applied to the skin and mucous membrane, colchicum acts as an **irritant**, producing redness and smarting. Inhaled, its powder causes **sneezing** and watering of the eyes.

Internally. **Gastro-intestinal tract.**—It acts as an **irritant** to the mouth and fauces and increases salivation. Given either by the mouth or hypodermically (for the active principle is eliminated into the intestine) in small doses, it increases the gastric and the intestinal secretion, but this effect is not observed in every case. In moderate doses it causes **purging, vomiting** and **abdominal pain.** In large doses it is a powerful **gastro-intestinal irritant**

Liver.—In large doses it is a powerful direct **hepatic stimulant**, increasing the amount of bile secreted and the biliary constituents proper, though rendering the bile more watery.

Circulation and **respiration.**—It depresses the circulation, lowers the blood-pressure and slows the respiration. The pulse becomes feeble, soft and rapid. These effects are probably due not so much to the colchicine acting on the cardiac and respiratory organs, as to the consequences of severe gastro-enteritis.

Nervous system.—The brain is not affected even by toxic doses. In mammals the cord is chiefly affected. In poisoning

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the sensory nerves are powerfully depressed while the **spinal motor centres** are only weakened.

Kidneys.—Its action on the kidneys is uncertain. It may increase their action, especially as regards the excretion of urea, uric acid and other solids of the urine.

Acute toxic action.—The chief symptoms are those of gastro-intestinal irritaion in a grave form. Violent burning in the throat, œsophagus and stomach; intense thirst; severe colic with vomiting and purging; the stools being first serous, then slimy and finally bloody; great prostration; rapid, feeble and thready pulse; cold skin bedewed with sweat; slow and laboured respiration and lastly death during collapse from respiratory paralysis; consciousness not being lost.

Antidotes.—Emetics, followed by demulcent drinks, as white of egg freely diluted with water. Tannic acid is a chemical antidote. Stimulants, tea and coffee; and morphine hypodermically.

Chronic toxic action.—Small medicinal doses long continued, bring about furred tongue, disagreeable taste, loss of appetite, thirst, epigastric pain, flatulence and diarrhœa.

THERAPEUTICS.

Internally.—Striking results follow the administration of colchicum in **acute gout.** The severest pain and inflammation are removed in a few hours after a drachm or two of the wine of colchicum. It succeeds well in first attacks on robust patients, but cannot prevent a relapse even if it is continued during the interval between the attacks. How it acts in this disease is not known. Dr. Garrod has experimentally shown that colchicum can in no way influence the elimination of uric acid in gouty people. Besides its specific property in gout, colchicum has been found useful in many other complaints of gouty people, such as **dyspepsia, headache, hepatic congestion, neuralgia, bronchitis, urethritis, eczema,** &c. It affords no relief in the chronic gout of old debilitated persons. **Rheumatic arthritis** may sometimes be relieved by colchicum and potassium iodide, but rheumatism is never benefited. For its direct cholagogue property, it may be advantageously combined with a purgative. A few grains of blue pill and compound colocynth pill make a valuable combination in the **constipation** of gouty persons.

Caution.—It should be avoided or given with great caution to the weak, the infirm and those who suffer from cardiac weakness, chronic diarrhœa, chronic dysentery or colic.

Prescribing hints.—Colchicum may be administered in *acute gout* in two ways,—either in full doses, say 1 dr. of the wine, repeated every 2, 3 or 4 hours, or in repeatedly small doses, say 20 ms. of the wine, every 3, 4 or 6 hours while the pain lasts. It should never be combined with acids as they *intensify* its irritating property while alkalis given with it mitigate the same. Magnesia makes a valuable corrective, as in the following formula—Vin. Colchici 4 drs., Mag. Sulph. 1 oz., Mag. Carb. 2 drs., Aq. Menth.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pip. *ad* 12 ozs. M. $\frac{1}{12}$th part every fourth hour. Ordinarily the wine is used but it deserves to be noted that the wine of the seeds is stronger than that of the corm. As it is a cardiac depressant the bowels must always be kept open during a course of colchicum to prevent accumulation of the drug in the system.

COLLODIUM. Collodion.

Source.—Prepared by mixing pyroxylin 1, ether 36, and alcohol (90 p.c.) 12, and setting aside for a few days and decanting the clear solution.

Characters.—A colourless, inflammable, syrupy liquid with ethereal odour. Leaves a thin, transparent film which contracts on drying.

Official Preparations.

1. **Collodium Flexile.**—1 in 48. Does not contract on drying.
2. **Collodium Vesicans.**—See p. 310.

Non-Official Preparations.

1. **Anodyne Colloid.** *Syn.—Amyl Colloid.*—Amyl Hydride 1 oz., Aconitine 1 gr., Veratrine 6 grs., Collodion to 2 ozs. Relieves pain instantly in neuralgia, sciatica, lumbago, &c.
2. **Collodium Stypticum. B.P.C.** *Syn.—Styptic Colloid.*—Benzoin 44 grs., Absolute Alcohol 1 oz. Dissolve and filter, and add Tannic Acid 1 oz., Ether (sp. gr. 0·72) 4 ozs., and Pyroxylin 44 grs. Mix, set aside for 3 days, and decant. A powerful local hæmostatic when applied to a bleeding surface.
3. **Celloidin.**—Pyroxylin purified by solution in alcohol and ether. For embedding miscroscopic specimens and for surgical use. For the latter purpose it is dissolved in equal parts of methylated ether and alcohol in the proportion of 1 to 7.
4. **Photoxylin.**—A similar preparation.
5. **Collodium Belladonnæ.** *Syn.—Emp. Belladonnæ Fluidum. B.P.C.*—See Page 261.

Pharmacology and Therapeutics.

Externally.—Painted over the skin, collodion leaves a thin film from the evaporation of ether. This coating is impervious to air and moisture, but contracts and cracks as it dries (not the flexile collodion), and thereby causes a **partial anæmia** of the part by pressure on the local blood-vessels. As an *antiseptic protective covering*, it may be usefully applied to **small, inflamed, broken or cut surfaces chapped nipples or threatening bedsores.** It is particularly suited to **scalp wounds,** as by its contractile property it not only helps to draw the edges together, but does away with the necessity of a bandage. It may be employed to arrest local **hæmorrhage** from small cuts or wounds, as in leech-bites, and to close **punctured openings** as in paracentesis. For its **pressure-effect on the local circulation,** it has been found useful in small **nævi** and **portwine marks.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

It reduces inflammatory swelling when painted over **boils** in their early stages, and on **erysipelatous surfaces**. If painted over the face in **small pox** it lessens pitting, and when applied to the mouth of the urethra or orifice of the prepuce it prevents nocturnal **incontinence of urine** in children. Mixed with salicylic acid (see p. 195), it dissolves **corns** and **warts**, and with salicylic acid and zinc chloride or lactic acid, small **lupoid** and **epithelial growths**. With iodoform it forms a very effective pigment for **glandular swellings**, and with iodine for **ringworm, alopecia** and **inflamed gouty** or **rheumatic joints**.

Caution.—No flame should be brought near the part until the evaporation is complete.

COLOCYNTHIDIS PULPA.

Colocynth Pulp. N. O. *Cucurbitaceæ.*

Syn.—Bitter Apple. **Syn. I. V.**—*Mákhál phal. Indráyan,* Beng. Hind. *Indrabáruni,* Sans

Habitat.—Imported from Smyrna, Trieste, France and Spain.

Source.—The dried pulp of the fruit of *Citrullus colocynthis*, freed from seeds.

Characters.—The fruit in peeled, broken balls about 2 in. in diameter. The pulp (broken up) is light, spongy, whitish, odourless, intensely bitter. *Impurities.*—Seeds, cortex and starch.

Identification.—The apple when entire is easily identified. The fragments are recognised by their spongy, porous and tearable characters. The seeds are egg-shaped, small, greenish yellow.

Composition.—(1) *Colocynthin*, a bitter glucoside. (2) *Resinous Matter* known as citrullin, colocynthein and colocynthitin. (3) *Mucilage* and *Gummy Matter*.

Action.—Drastic purgative.

Official Preparations.

1. **Extractum Colocynthidis Compositum.**—1 in 4½ (nearly). Commonly prescribed with hyoscyamus to prevent griping.
B.P. Dose.—2 to 8 grs.

2. **Pilula Colocynthidis Composita.**—1 in 6. The water should only be added to this preparation at the time of dispensing.
B.P. Dose.—4 to 8 grs.

3. **Pilula Colocynthidis et Hyoscyami.**—1 and 3 in 9. Does not gripe. **B.P. Dose.**—4 to 8 grs. Its 5 grs. pills are known as **Hamilton's pills**, and 2½ grs. pills as **Christison's pills**.

Pharmacology.

Internally.—In minute doses colocynth is a **bitter tonic**. In moderate doses it stimulates the **intestinal glands** and **muscular fibres**, and the **liver**, causing watery evacuations and griping. Hence it is a **hydragogue drastic purgative**. These effects may be produced if the drug is given either by the mouth,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

or hypodermically, or injected into the circulation. In large doses these actions are aggravated and there is an intense **gastro-intestinal irritation**, reflexly affecting other abdominal organs. It may therefore cause abortion or cystitis.

THERAPEUTICS.

Internally.—It is rarely prescribed for its tonic virtue, but is often given in combination with aloes and mercury in **constipation** due to hepatic disorder. It is an excellent purgative to relieve **portal engorgement**. It should always be given with hyoscyamus or belladonna to prevent griping. Hence pil. colocynth. et hyoscyami is a valuable preparation. Because of the watery character of the stools, it may sometimes be given in **ascites, dropsy** or **cerebral congestion**, but scammony, jalap and elaterium are more powerful in this respect.

Caution.—It should not be given either to pregnant women or to persons who are subject to diarrhœa, dysentery, piles or gastro-intestinal congestion.

CONII FOLIA.

Conium Leaves. N.O. *Umbelliferæ.*

Syn.—Hemlock Leaves.

Habitat.—Britain.

Source.—The fresh leaves and young branches of *Conium maculatum*, collected when the fruit begins to form (in June).

Characters.—*Leaves* divided pinnately, the lower decompound, about 2 ft. long, glabrous, arising from a smooth stem marked with purple spots. *Petioles* clasping; those of lower leaves hollow. Odour strong, disagreeable, *like that of mice*, especially when rubbed with a solution of potash.

Composition.—The same as that of the fruit.

Incompatibles.—Astringents, vegetable acids, caustic alkalis.

OFFICIAL PREPARATIONS.

1. **Succus Conii.**—Brownish. **B.P. Dose.**—1 to 2 drs. but often given in much larger doses.

2. **Unguentum Conii.**—2 in 1. Yellow. Evaporate the juice to one-eighth. Becomes mouldy on keeping.

NON-OFFICIAL PREPARATION.

1. **Vapor Coninæ. B.P. 1885.**—Hemlock juice 4, Liq. Potassæ 1, Distilled water 8. *Dose.*—20 drops upon the sponge of an inhaler. A useful sedative inhalation in obstructive bronchial affections.

CONII FRUCTUS. Conium Fruit.

Source.—The dried, full grown, unripe fruits of *Conium maculatum.*

Characters.—Ovoid, greenish-grey, ⅛ in. long, nearly as broad,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

laterally compressed, and crowned by the depressed stylopod. In commerce, mericarps are separated; each glabrous. with 5 irregular crenate ridges; endosperm deeply grooved. Odour perceptible when rubbed with solution of potash.

Identification.—Its peculiar shape and general appearance are characteristic. May be mistaken for caraway, anise and dill fruits, but is distinguished by the absence of vittæ.

Composition.—(1) *Conine*, an oily, volatile liquid alkaloid with a mouse-like odour. This is the active principle. (2) *Methyl-conine*, a colourless fluid alkaloid. (3) *Conhydrine*, an inert alkaloid. (4) *Conic Acid.*

Official Preparation.

1. **Tinctura Conii.**—1 in 5. Brown. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Ext. Conii Liq. B.P.C.**—Exhausted. with alcohol (60 p.c.), containing acetic acid 10 p.c. *Dose.*—5 to 15 ms.

2. **Conina.** *Syn.—Cicutine, Conicine.*—The active principle. The commercial conine contains also methyl-conine and conhydrine.

Dose.—¼ to 2 grs.

3. **Coninæ Hydrobromidum.**—In colourless prisms resembling mag. sulph., soluble in water. A powerful respiratory sedative. Recommended in traumatic tetanus, spasmodic brohchitis, epilepsy, mania, &c.

4. **Pil. Conii Comp. B.P. 1885.**—Ext. conii 2½ ozs., Pulv. Ipecac. ½ oz., Treacle *q. s.* Mix. *Dose.*—5 to 10 grs.

Pharmacology.

Externally.—It has no action on the unbroken skin but paralyses the sensory and motor terminals, particularly the former, when applied to the mucous membrane or an abraded surface. It is therefore a **local sedative and antispasmodic.**

Internally. **Gastro-intestinal canal.**—Occasionally causes vomiting and purging.

Circulation.—Conine circulates unchanged. It increases the frequency of the pulse, probably from the depressed condition of the vagal terminations. It does not seem to affect the cardiac and vasomotor centres.

Respiration is **profoundly depressed**, and death takes place from **asphyxia**, due to (1) the paralysis of the whole of the motor nerves, and (2) subsequent paralysis of the respiratory centre, and (3) the motor tract of the cord.

Nervous system. *Cerebrum.*—Hemlock has no action on the intellectual faculties. Consciousness remains unimpaired until asphyxia sets in.

Medulla and *cord.*—These remain unaffected until the drug is given in toxic doses, when the functions of the **motor cornua** and of the **respiratory centre** are feebly depressed. It is the methyl-conine which probably affects them.

Nerves.—It is a powerful **paralyser of all the motor**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

nerves, affecting first the end plates, then gradually that whole trunk, and lastly the anterior cornua of the cord. As a result of these actions, all the muscles of the body which are concerned in voluntary and reflex movements are paralysed, but individually they retain their irritability to local stimuli. The sensory terminals are not affected except by the local application, but the conducting power of the sensory trunks seems to be impaired by toxic doses. The terminations of the vagus are paralysed.

Eye.—Conium dilates the pupil, impairs accommodation, and causes ptosis, probably because of the paralysis of the periphery of the third nerve. These effects follow whether conine is locally applied to the eye or swallowed.

Elimination.—It is eliminated in the urine unchanged.

Toxic action.—Hemlock is a powerful poison, yet some animals, such as goats, sheep and horses take it without harm. In moderate doses it causes heaviness of the limbs, staggering gait, giddiness, confused vision, and thick speech; and in poisonous doses, complete paralysis of the muscles, fixed eyes, dilated pupils, dysphagia, loss of voice, shallow laboured breathing, and death from asphyxia.

Antidotes.—Emetics and pump. Tannic acid followed by "lavage." Artificial respiration. Stimulants, strychnine and atropine hypodermically,

THERAPEUTICS.

Conium is not much used now-a-days on account of the variable strengths of its preparations, and the instability of its alkaloids.

Externally.—Hemlock ointment is a very useful preparation. It relieves the itching of pruritus ani, and the pain and spasm of fissures and ulcerated hæmorrhoids. The strength of the B.P. ointment requires sometimes to be increased, or belladonna or cocaine to be added to it. Cripps recommends the addition of 10 grs. of persulphate of iron to each ounce, if the ointment is intended for anal fissures.

Internally.—On account of its action upon the end-plates conium has been found useful in many convulsive diseases, such as chorea, infantile convulsions, paralysis agitans, laryngismus stridulus, &c. Ringer gave 7 drs. of the juice hourly to a choreic child without harm. In whooping cough and mania it has also been found serviceable. Its value in tetanus is doubtful. Pill. conii comp. B.P. 1885 is an excellent cough pill for lessening the sensibility of the respiratory centre in spasmodic forms of chronic bronchitis.

Caution.—The effects should be watched. As soon as any difficulty of swallowing or a feeling of weight in the legs is observed, the administration of the drug is to be suspended.

Prescribing hints.—The juice and the tincture are the only reliable preparations. For a child one year old 10 to 20 or 30 ms. of the juice is not a large dose. Conine hydrobromide should be given in doses of $\frac{1}{3}$ gr. gradually increasing to 2 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

CONVALLARIA MAJALIS. *(Non-Official.)*

N.O. *Liliaceæ.*

Habitat.—The temperate zone.

Source.—The flowers, as well as the whole plant of *Convallaria majalis*, the Lily of the valley.

Composition.—Two glucosides, (1) *Convallarin*, a drastic purgative. *Dose.*—3 to 4 grs. (2) *Convallamarin*, a cardiac tonic. *Dose.*—½ to 2 grs.

Action.—Resembles that of Digitalis.

Non-Official Preparations.

1. **Extractum Convallariæ.**—An aqueous extract. *Dose.*—2 to 8 grs.
2. **Ext. Convallariæ Fluidum. U.S** —*Dose.*—2 to 10 ms.
3. **Tinctura Convallariæ. B.P.C.**—1 in 8 of proof spirit. *Dose.*—5 to 20 ms.

Pharmacology and Therapeutics.

Convallaria has been used for ages by the Russian peasants for dropsies, and it is a valuable substitute for digitalis in cases where that drug is not well borne.

The extract is a fairly reliable preparation but the most uniform results are obtained from convallamarin, which is specially useful for preventing cardiac failure in chloroform narcosis.

Convallaria is not only useful in cases where there is actual valvular disease but it is of special value in tachycardia of nervous origin.

COPAIBA.

Copaiba. N.O. *Leguminosæ.*

Syn. B.P.—Copaiva, Balsam of Copaiba.

Habitat.—Valley of the Amazon. West and East Indies.

Source.—The oleo-resin obtained from the trunk of *Copaifera Lansdorfii*, and other species of *Copaifera.*

Characters.—A light-yellow or pale-golden, thick, viscid liquid; generally transparent; sometimes opalescent or slightly flourescent. Odour peculiar, aromatic. Taste acid, somewhat bitter. *Solubility.*—Entirely in absolute alcohol ether, benzol, fixed and volatile oils. *Impurities.*—Turpentine, garjun balsam and fixed oils.

Identification—It is recognised by its characteristic smell and appearance.

Composition.—(1) The *Volatile Oil* (*off.*), 48 to 85 p. c. (2) The *Resin*, 15 to 52 p. c., which remains dissolved in the oil. The resin consists of (*a*) *Capaivic Acid*, a crystalline resin; and (*b*) a non-crystallizable *Viscid Resin.*

Action.—Antiseptic, stimulant, diuretic. **B.P. Dose.**—5 to 20 ms.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparation.

OLEUM COPAIBÆ.

Oil of Copaiba.

Source and Characters.—A colourless or pale-yellow oil with the odour and taste of copaiba, distilled from copaiba; sp. gr. 0.900 to 0·910. *Solubility.*—1 in 1 of absolute alcohol. **B.P. Dose.**—5 to 20 ms.

Non-Official Preparations.

1. **Copaiba Resin.**—Obtained by distilling off the volatile oil. Diuretic. *Dose.*—10 to 20 grs.

2. **Liquor Copaibæ Solubilis. P. F.**—Copaiba 20 ozs., Solution of Potash 30 ozs., Water 10 ozs. Boil copaiba and solution of potash for 1 hour and mix with water thoroughly, set aside until cold. Decant the clear liquor from the upper oily portion and sediment, and evaporate to 38 ozs. To this add 2 ozs. of solution of potash.
Dose.—½ to 1 dr.

3. **Pasta Copaibæ.**—Copaiba 8, Cubebs 24, Extract of Hyoscyamus 1, Camphor 1, Treacle *q. s.* Make into a paste.
Dose.—A piece of the size of a filbert nut three or four times a day.

Pharmacology.

Externally.—Copaiba acts as a stimulant to the skin.

Internally. **Gastro-intestinal tract.**—It imparts an acrid nauseous taste, and a feeling of warmth to the epigastrium, and gives rise to disagreeable eructations. Continued long it causes dyspepsia and looseness of the bowels.

Mucous membrane.—The volatile oil and resin are readily absorbed into the blood, and are excreted by the mucous membranes, particularly by the mucous surface of the **genito-urinary** and **respiratory tracts**, which it stimulates, producing an increased vascularity, and increased secretion which, if **foul**, is **disinfected**. Thus copaiba is a **disinfectant** and **expectorant**, and a **stimulating disinfectant** to the genito-urinary surface. It imparts the odour of the drug to the breath, urine and mucous secretions.

Skin.—It is excreted by the sweat glands, and acts as an irritant to the skin, producing sometimes an erythematous eruption, known as "copaiba rash." A portion of it is also excreted by the milk to which it imparts its nauseous flavour.

Kidneys.—It powerfully **stimulates** the kidneys, perhaps more than any other drug containing either resins or volatile oils. It is therefore a powerful **diuretic**. This diuretic action is no doubt greatly due to the **resin**, which during its excretion locally stimulates the secreting cells of the kidneys. Large doses cause **renal congestion**, with lumbar pain, and scanty, bloody and albuminous urine. The resin and volatile oil are excreted in the urine and have an antiseptic action on it. As the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

resin is precipitated by nitric acid, it should not be mistaken for albumen. The resin is dissolved by heat or alcohol; moreover the resinous precipitate is evenly distributed in the fluid.

Micro-organisms.—By disinfecting the secretion of the genito-urinary tract as well as by rendering the urine aseptic, copaiba decidedly acts as a poison on many infective micro-organisms, especially the gonococcus, which is no doubt destroyed by the oleo-resin as it passes out.

THERAPEUTICS.

Internally. **Mucous membrane.**—As a *stimulating disinfectant* to the mucous secretions, it has been found useful in **vaginitis, cystitis, pyelitis, leucorrhœa** and **chronic bronchitis.** Cystitis and leucorrhœa may as well be locally treated by injecting copaiba oil diluted with its own bulk of warm castor oil. But it is rarely used in these cases.

Gonorrhœa.—On account of its *specific action on the gonococcus,* it is a very valuable medicine for **gonorrhœa** and **gleet.** It should be given when the acute symptoms have somewhat subsided. It should be given in 15 to 20 m. doses, increasing it slowly, as it often upsets the stomach. Its effect is not so marked on **gleet,** though it often benefits when locally administered.

Kidneys.—As a *powerful diuretic,* both copaiba and its resin have been employed in **dropsy,** due either to hepatic or cardiac disorder. It is contra-indicated in **Bright's disease.**

Prescribing hints.—Copaiba may be given in capsules, pills, paste, or solution as Liq. Copaib. Solubilis. It may be emulsified by the process described in page 82. Tincture of quillaia or solution of potash helps emulsification. Cinnamon water, peppermint water, tinctures of ginger and orange fairly cover its unpleasant smell. The oil is best given in capsules or suspended by mucilage. The efficacy of the drug is greatly increased if it is given with sandal wood oil, cubebs oil, buchu &c., as in the following prescription used by the writer invariably with success :—Ol Santal. Flav. 4 drs., Copaiba 1 oz., Liq. Potassæ 1 dr., Spt., Æther. Nitrosi 4 drs., Tr. Hyoscyam. 4 drs., Tr. Buchu 1 oz, Mucilag. acaciæ 1 oz., Ol. Cinnamom. 10 ms., Syrup to 6 ozs. Mix and make a creamy emulsion. *Dose.*—one dessert spoonful thrice daily after food.

CORIANDRI FRUCTUS.

Coriander Fruit. N.O. *Umbelliferæ.*

Syn. I.V.—*Dhaniá,* Beng. Hind.

Habitat.—Britain. Cultivated in India.

Source.—The dried ripe fruit of *Coriandrum sativum.*

Characters.—Nearly globular, $\frac{1}{8}$ in. in diameter, uniform, brownish-yellow, glabrous. Two mericarps closely united, and crowned by calyx-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

teeth and stylopod. Odour aromatic, especially when *bruised*. Taste agreeable.

Identification.—Recognised by its characteristic appearance, odour and taste.

Composition.—*Volatile Oil* (*off.*).

Action.—Stimulant, carminative. **B.P. Dose.**—20 to 60 grs.

Official Preparation.

OLEUM CORIANDRI.

Oil of Coriander.

Source and Characters.—A colourless or pale-yellow oil obtained by distilling coriander fruit. (1 lb. of fruit yields about 42 grs. of oil.) *Solubility.*—2 in 1 of alcohol (90 p.c.). Sp. gr. 6.870 to 0.885.

Composition.—(1) *Coriandrol*, up to 90 p.c. (2) *Pinene.*

Enters into.—Syr. Sennæ. **B.P. Dose.**—½ to 3 ms.

Pharmacology and Therapeutics.

The actions and uses of coriander fruit resemble more or less those of dill and anise fruits. The oil is specially used to render medicines more palatable and to prevent griping. The fruit is used in Indian cookery, and its mericarps are chewed with prepared *pán* or sometimes alone to remove the after-taste of drugs. The mericarps lightly fried and salted make a pleasant masticatory after meals.

COSCINIUM. Coscinium.

N. O. *Menispermaceæ.*

(Ind. and Col. Addendum.)

Syn.—False Calumba. **Syn. I.V.**—*Gách-haldi*, Beng. *Jhár-haldi*, Hind. *Dárvi*, *Dáruharidrákam*, Sans. *Mara Munjil*, Tamil.

Habitat.—India, Eastern Colonies.

Source.—The dried stem of *Coscinium fenestratum.*

Characters.—In woody, cylindrical, straight or twisted pieces, about 4 in. in diameter, furrowed longitudinally. Covered with a pale yellowish-grey cork. No odour. Taste bitter.

Composition.—(1) *Berberine.*

Official Preparations.

1. **Infusum Coscinii.**—Infuse ½ hour. **B.P. Dose.**—½ to 1 oz.
2. **Liq. Coscinii Conc.**—1 in 2. By maceration and evaporation to 1 pint. **B.P. Dose.**—½ to 1 dr.
3. **Tinctura Coscinii.**—1 in 10. Macerate. **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

Internally.—Slices of the cut root are known as false calumba, because they act as a **bitter, stomachic tonic** like calumba.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

It has been found to be an efficient bitter tonic after a long trial in the Madras hospitals.

The wood yields a yellow dye closely resembling turmeric.

CREOSOTUM. Creosote.

Source.—A mixture of guaiacol, creosol, and other phenols, obtained in the distillation of wood tar.

Characters.—A colourless or yellowish, highly refractive liquid with an empyreumatic odour and acrid taste. Neutral or faintly acid in reaction. *Solubility.*—1 in 150 of cold, and more in hot water; freely in alcohol (90 p.c.), ether, chloroform, glycerin, and glacial acetic acid. *Impurities.*—Phenol, which hardens on cooling, and the less volatile liquids.

Identification.—Its characteristic smell helps recognition, but it should not be mistaken for that of carbolic acid. Its colour is not reliable.

Composition.—(1) *Guaiacol*, soluble 1 in 80 of water, and freely in alcohol (90 p.c.), glycerin and fixed oils, (2) *Creosol*, soluble 1 in 150 of water, and sparingly in glycerin.

Incompatibles.—Silver salts (see p. 109.).

Action.—Antiseptic, disinfectant, deodorant. **B.P. Dose.**—1 to 5 ms. *Max. Dose.*—30 to 60 ms. gradually increased.

Official Preparations.

1. **Mistura Creosoti.**—1 m. in 1 oz. **B.P. Dose.**—½ to 1 oz.
2. **Unguentum Creosoti.**—1 in 10.

Non-Official Preparations and Derivatives.

1. **Oro-nasal Inhalations:**—Creosote or a mixture of Creosote, Phenol, Terebene, &c. Is used to medicate respirators.
2. **Vapor Creosoti. B.P. 1885.**—Creosote 12 ms., Boiling Water 8 ozs. Useful in phthisis, bronchitis, gangrene of the lungs, &c.
3. **Creosotal.** *Syn.—Creosote Carbonate.*—A viscid, amber-coloured, almost odourless and tasteless liquid, insoluble in water, containing carbonates of guaiacol and creosol. *Dose.*—5 to 20 ms.
4. **Creosote Phosphate.** *Syn.—Phosote.*—A yellowish oily liquid insoluble in water. *Dose.*—5 to 20 ms.
5. **Creosote Phosphite.** *Syn.—Phosphotal.*—In glacial crystals.
6. **Creosote Tannate.** *Syn.—Tannosal.*—A brown powder dusted like iodoform, soluble in water. In phthisis. *Dose.*—5 to 15 grs.
7. **Creosote Valerianate.** *Syn.—Eosote.*—An oily liquid used in phthisis epidermically. Checks gastric fermentation. *Dose.*—3 to 12 grs.
8. **Creosoform.**—A compound of creosote and formaldehyde.
9. **Guaiaform** a similar combination with guaiacol.
10. **Guaiacol.**—*Medicinal guaiacol* is the chief constituent of beech creosote. *Synthetic Guaiacol* is prepared from pyrocatechin in crystals. Considered to have **lethal action** on **bacilli** of **tuberculosis**. Used as a substitute for creosote. Acts as **antipyretic** when injected into, or painted over, painful nerves. Sometimes it produces cardiac weakness. *Dose.*—1 to 5 ms. May be hypodermically injected dissolved in almond or olive oil.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

11. **Guaiacol Benzoas.** *Syn.—Benzosol.*—In colourless almost odourless and tasteless crystals. It is less nauseous but it is difficult to get it pure. Useful in incipient phthisis. *Dose.*—4 to 12 grs.

12. **Guaiacol Carbonas.** *Syn.—Duotal.*—A colourless crystalline, tasteless powder. Used as a substitute for guaiacol, with sugar or in cachets. This is largely used in phthisis. *Dose.*—5 to 15 grs.

13. **Guaiacol Valerianas.** *Syn.—Geosote.*—A liquid combination of Valerianic Acid and Guaiacol. *Dose.*—3 to 8 ms. in capsules.

14. **Guaiacetin.** *Syn.—Sodium Pyro-catechin-mono-acetate.* *Dose.*—5 to 8 grs.

15. **Guaiacol Salol.** *Syn.—G. Salicylate.*—A good intestinal disinfectant. *Dose.*—10 to 15 grs.

16. **Thiocol.** *Syn.—Potassium-guaiacol-sulphonate.*—Odourless white crystals, soluble in water. Has a pleasant taste, and does not irritate even when administered hypodermically. The appetite is sharpened and it is always well borne. Combines the good effects of creosote and guaiacol without their disadvantages. Especially useful for children. Has given excellent results in phthisis and intestinal tuberculosis and is a satisfactory substitute for quinine in malaria in cases where that drug is not tolerated. *Dose.*—15 grs.

17. **Guæthol.** *Syn.—Ajacol.*—Pyrocatechin-mono-ethyl-ester. An oily liquid. Allays pain.

18. **Guaiacol Camphorate.**—A combination of guaiacol and camphoric acid. For night sweats of phthisis. *Dose.*—5 grs.

19. **Guaiacol Cinnamate.** *Syn.—Styracol.*—For intestinal phthisis. *Dose.*—15 grs. daily.

20. **Guaiacol phosphite.** *Syn.—Guaiaco-phosphal.*—White glistening crystals. For tuberculosis. *Dose.*—6 to 10 grs.

PHARMACOLOGY.

Externally.—The action of creosote is very similar to that of carbolic acid, creosote being an **antiseptic, disinfectant,** and **deodorant,** but as it is a complex product, its action is not always uniform, and cannot therefore be relied upon. Painted like guaiacol or rubbed into the skin it acts as an **antipyretic.**

Internally. **Gastro-intestinal-tract.**—When applied to the mouth, it produces smarting and salivation, and destroys epithelium. In the stomach, it is supposed to depress the terminal filaments of the sensory nerves of the mucous membrane, and to arrest **putrefactive** and **fermentative processes** by destroying low forms of vegetable life such as torulæ and sarcinæ without affecting the pepsin. Large doses cause nausea, vomiting, colic and diarrhœa, with frequent pulse and slow and laboured respiration, without producing any convulsions.

Secretions.—It is readily absorbed into the blood, and undergoes no change in it. It is **eliminated** by the **bronchial mucous membrane** and **kidneys,** which it **stimulates,** increasing the bronchial and urinary secretions and if fœtid, removing their fœtor.

Micro-organisms.—It seems to act as a poison to microbes,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

especially to tubercle bacilli, either during the process of elimination, or when locally brought into contact with them, as by inhalation.

THERAPEUTICS.

Externally.—Like carbolic acid, it cannot be used as a **general antiseptic** on account of its indefinite composition. The official ointment is useful in **ulcers, scaly skin diseases** and some forms of **eczema**. Creosote vapor or creosote spray is useful inhalation in **chronic bronchitis, phthisis, gangrene** of the **lungs**, &c. A few drops of creosote rubbed into the pit of the stomach, the part being afterwards covered with cotton wool, will often bring down the temperature in cases of fever where all other means have failed.

Internally. **Gastro-intestinal tract.**—A pellet of cotton-wool soaked in creosote relieves **toothache** when introduced into the cavity of the painful carious tooth. In minute doses, 1 to 3 ms., it has been found to relieve **nausea, vomiting** and **gastralgia**, caused either by any local mischief or by reflex irritation. It checks also **fermentative dyspepsia** and **diarrhœa**, when given with bismuth and alkalis. It is an excellent remedy for **sloughing dysentery**. Dr. V. de Holstein considers it to be the most effective remedy for **chronic constipation**, in 1 to 2 m. doses gradually increased to 7 to 8 ms.

Lungs.—Both creosote and guaiacol are considered to be almost specifics for **phthisis**, because of their lethal effects on the tubercle bacilli. They must be commenced early and continued long and in increasing doses. The sooner the constition is brought thoroughly under the influence of the drug the better. Commencing with 5 to 10 m. doses, it may be increased up to 60 ms. Guaiacol carbonate and thiocol are better borne than creosote, and they may with advantage be combined with quinine.

Prescribing hints.—Creosote may be given by the mouth, rectum, hypodermically mixed with almond oil, rubbed into or applied to the skin, or inhaled. By the mouth it is best given in pilules, capsules, perles, emulsions or mixed with milk or cod-liver oil. Sometimes the mucous secretion of phthisis is wonderfully decreased by using the creosote spray. During hæmoptysis creosote treatment must be stopped. It sometimes keeps up the expectoration and a mild form of hæmoptysis, if continued too long.

The creosote draught of the Victoria Park Hospital is a far better preparation than the official Mist. Creosoti. It consists of Creosote 5 to 30 ms., Tinct. Gentian Co. 15 ms., Alcohol (90 p.c.) 15 ms., Ext. Glycyrrhyzæ Liq. 30 ms. water 1 oz. Martindale's Pil. creosoti, which consists of equal parts of creosote and curd soap, is also an excellent formula.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

For inhalation creosote may either be given alone or mixed with phenol upon a respirator, or it may be used in the form of the official Vapor creosoti. The Brompton formula is creosote 1, spirit of menthol (20 p.c.) 1, spirit of chloroform 1. The addition of spirit of chloroform makes it more sedative in its action.

CRETA PRÆPARATA. See page 293.

CROCUS. Saffron.

N.O. *Iridaceæ.*

Syn. I.V.—*Jáfrán*, Beng, *Keshar*, Hind. *Kumkuma*, Sans.

Habitat.—Spain, Kashmir, Persia.

Source.—The dried stigmas and tops of the styles of *Crocus sativus.*

Characters.—Each portion 1 in. long, consists of three orange-red stigmas, thickened and tubular above, notched at the extremities, and united below to the top of the yellow style. Flexible and unctuous to touch; odour aromatic; taste bitter, aromatic; imparts an orange-yellow colour to the fingers when rubbed, and to warm water.

Impurities.—Marigold and saffron petals, stamens, chalk, coloured powders, oil, barium sulphate, lime, magnesia, &c.

Identification.—Its characters and flavour are characteristic. A lens may be used to distinguish foreign substances.

Composition.—(1) *Polychroite* or *Crocin*, an orange-red glucoside. (2) A *Volatile Oil.*

Enters into.—Decoct. Aloes Co., Tr. Cinch. Co., and the

Official Preparation.

1. **Tinctura Croci.**—1 in 20. Bright yellowish-brown.
B.P. Dose.—5 to 15 ms.

Uses.

Saffron is chiefly used as a colouring and flavouring agent, but it is very expensive. Many Indian dishes are coloured and flavoured by it.

CROTONIS OLEUM.

Croton Oil. N. O. *Euphorbiaceæ.*

Syn. I.V.—*Jaipáler tel*, Beng. *Jámálgotá ke tel*, Hind.

Habitat.—India, Ceylon, Indian Archipelago.

Source.—The oil expressed from the seeds of *Croton tiglium.*

Characters.—Brownish-yellow to dark reddish-brown, viscid. Odour disagreeable. Taste acrid, burning. *Solubility.*—In ether, chloroform, olive oil, partially in alcohol (90 p.c.).

Identification of seeds.—The seeds are non-official, but their appearance should be known. They are oval or oblong, dark-brown, marked with ramifications of the raphé. They resemble castor-oil seeds, which are brighter, polished and mottled.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Composition.—(1) *Crotolinic Acid*, which appears to be the active principle. (2) *Tiglic Acid* or *Methyl crotonic acid.* (3) *Crotonol*, which is non-purgative, but an irritant to the skin. (4) Several *Volatile Acids*, to which the odour is due. (5) Several *Fatty Acids.*

Action.—Pustulant, drastic purgative. **B.P. Dose.**—½ to 1 m.

Official Preparations.

1. **Linimentum Crotonis.**—1 in 8. A counter-irritant.

Pharmacology.

Externally.—Croton oil is a **powerful irritant** to the skin, producing burning, redness and a crop of vesicles, which soon turn into pustules, leaving unsightly scars. Its action is intensified by mixture with alkalis.

Internally. **Gastro-intestinal tract.**—Taken undiluted it is an irritant to the mouth and fauces. In a short time after a drop has been swallowed, griping, and abdominal heat and pain are felt, followed in an hour or two by repeated purging; the stools becoming more and more watery and the intervals shorter and shorter. It is therefore a **drastic purgative.** This action is probably due to its direct irritant effect on the stomach and intestines. The mucous membrane becomes red and œdematous and both intestinal peristalsis and secretion are considerably increased. Its action is greatly heightened by the bile salts and other alkaline secretions in the small intestine. In large doses the stools towards the end contain blood and mucus, and there is considerable general depression, leading sometimes to death from collapse. The action of croton oil is not entirely local, for it may purge if it is applied to the skin. It is not a hepatic stimulant.

Antidotes.—In the case of an over-dose of, or poisoning by, croton oil, wash out the stomach with gruel and mustard, or olive oil, or diluted milk (4 ozs. in 1 pint of water), and give demulcent drinks, such as linseed tea, milk-whey, gruel, &c. Opium internally or by enema, stimulants, &c.

Therapeutics.

Externally.—As a *counter-irritant* it is scarcely used now, though in former days the liniment was employed in **phthisis**, acute and chronic **bronchitis**, **pleurisy** and in chronic inflammatory conditions of the joints. The oil is recommended in obstinate **ring-worm** of the scalp, but the risk of suppuration and baldness counter-balances its advantages. The diluted liniment, or croton oil well diluted with olive oil (5 ms. to 1 oz.), is sometimes used in **alopecia**, but cantharides is a better and safer hair restorer.

Internally.—Croton oil is used only on rare occasions. As a *purgative* it is invaluable **in cerebral hæmorrhage, coma,** and

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

insanity on account of its minute dose and the rapid and complete evacuation of the bowels which it causes. In **obstinate constipation** and **intestinal obstruction** from impacted fæces, where there is no structural or inflammatory complication, croton oil may be given with benefit, but not till other purgatives have been tried. According to Brunton, croton oil 1 drop with 1 dr. of chloroform in glycerin 1 oz. removes **tapeworm** when other remedies fail. It may also be given in **dropsy, hydrocephalus, uræmia, delirium tremens,** &c.

Caution.—It must not be given to weak subjects, pregnant women, children, and those who suffer from piles, prolapse of the rectum, or chronic diarrhœa and chronic dysentery. It is inadmissible in inflammatory conditions of the stomach, intestines and peritoneum, and in organic obstruction of the bowels.

Prescribing hints.—Croton oil is usually given in pill (see p. 88) alone or mixed with compound colocynth pill. When patients are unconscious, as in apoplexy, the best method of administration is to mix it with butter or brown-sugar and place it on the back of the tongue. If used externally, vesication should be avoided and the patient warned against conveying the application to the face or scrotum, lest it should cause a severe inflammation. The maximum dose should not exceed 2 ms. a day.

CUBEBÆ FRUCTUS.

Cubebs. N. O. *Piperaceæ.*

Syn. I. V.—*Kábáb chini*, Beng. Hind.

Habitat.—Java and the Moluccas.

Source.—The dried full-grown unripe fruit of *Piper cubeba.*

Characters.—Globular, ¼ in. in diameter, black, wrinkled, tapering below into a rounded stalk, odour strong, aromatic; taste bitter, aromatic. Genuine crushed fruit imparts a crimson colour to H_2SO_4.

Identification.—Cubebs may be mistaken for Pepper and Pimento, but the wrinkled black appearance with the *stalk attached*, and its characteristic odour at once identify it. Powdered cubebs is reddish-brown and has a characteristic odour.

Composition.—(1) The *Volatile Oil* (*off.*) 6 to 15 p. c. (2) *Cubebin*, a neutral body. (3) A *Resin*, containing *cubebic acid.* (4) *Piperine.* (5) A *fatty oil.* (6) *Gum.*

Action.—Aromatic, stimulant, diuretic. **B.P. Dose.**—30 to 60 grs.

Official Preparations.

1. **Oleum Cubebæ.**—A pale-green, yellow or colourless oil, smelling of cubebs, distilled from cubebs. Sp. gr. 0·910 to 0·930.

B. P. Dose—5 to 20 ms.

2. **Tinctura Cubebæ.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

Pharmacology.

Externally.—The action of cubebs depends upon the oil and the resin which it contains. It causes **rubefaction** when rubbed into the skin.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Internally. **Gastro-intestinal tract.**—The action of cubebs here resembles that of pepper. In small doses, it is a **stimulant, stomachic** and **carminative**, and in large doses it impairs digestion. In still larger doses it causes **gastro-intestinal irritation.**

Respiratory and **genito-urinary tracts, &c.**—Like many oleo-resins, cubebs enters the blood and is carried to different tissues and organs, upon which it acts more or less like copaiba. It **stimulates** the **secretions** of the mucous membranes of the **respiratory** and **genito-urinary passages**, and renders them aseptic. It also stimulates the action of the kidneys, and to some extent that of the skin. Sometimes it causes **erythema.**

Elimination.—It is chiefly excreted in the bronchial secretion and urine, and is probably found in the latter in the form of a salt of cubebic acid, which may be precipated by HNO_3. Many of the specific germs are destroyed by the products of the volatile oil as they pass out.

THERAPEUTICS.

Internally.—Unlike copaiba, cubebs is often used in the form of lozenges or inhalation to relieve **coughs, colds** and **sore-throat.** The cigarettes sometimes relieve a fit of **asthma.** On account of its specific action on the genito-urinary passages, it is often largely employed with copaiba in acute or chronic **gonorrhœa, gleet, cystitis.**

Prescribing hints.—The powdered cubebs may be given in lozenges, cachets, or as a paste with copaiba (see p. 365), and the oil in capsules, or in emulsion, often with copaiba, buchu, &c. (see p. 366).

CUCURBITÆ SEMINA PRÆPARATA.

N.O. *Cucurbitaceæ.*

Melon Pumpkin Seeds. Red Gourd Seeds.

(*Ind. and Col. Addendum.*)

Syn. I.V.—*Bilâti Kumrâr bij*, Beng. *Mithákadu ká bij*, Hind.

Habitat.—Mediterranean Colonies.

Source.—The prepared fresh ripe seeds of cultivated plants of *Cucurbita maxima* (*Cucurbita Pepo*).

Characters.—Flat, ovate, white exalbuminous, consisting of two cotyledons deprived of testa and tegmen. The seeds must not be more than one month old.

Composition.—(1) An *Oil*, expressed from the seeds.

B.P. Dose.—3 to 4 ozs.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—Both the seeds and the oil are efficient **anthelmintics** for **tapeworm.** The former are best given bruised

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

with a little water or milk on an empty stomach early in the morning, followed by a simple purgative at 10 A.M.; the latter in ½ oz. doses repeated at an interval of 2 hours and then followed by an aperient.

The plant, fruit and seeds are eaten by the natives of India.

CUPRI SULPHAS.

Copper Sulphate. $CuSO_4, 5H_2O$.

Syn.—Blue vitriol, Bluestone. **Syn. I.V.**—*Tutia*, Beng., Hind.

Source.—Obtained by the interaction of water, sulphuric acid, and copper or cupric oxide.

Characters.—In blue triclinic prisms. *Solubility.*—1 in 3.5 of cold water. Solution acid. *Impurities.*—Iron and other metals.

Identification.—Its blue colour and shape help recognition.

Incompatibles.—Alkalis and their carbonates, lime water, mineral salts (except sulphates), iodides and many vegetable astringents.

Actio -Caustic, astringent, emetic, tonic.

B.P. -As an astringent, ¼ to 2 grs., as an emetic, 5 to 10 grs.

Non-Official Preparations.

1. **Lapis Divinus.** *Syn.*—*Cuprum Aluminatum.*—Powdered Copper Sulphate, Potassium Nitrate and Alum, of each equal parts fused in an earthen crucible, $\frac{1}{30}$th part of powdered camphor being added towards the end. 2 grs. in 1 oz. of distilled water makes a good **eye-wash.**

2. **Ung. Cupri Oleatis.**—Copper Oleate 1, Lard 4; melt and mix. An excellent antiseptic and parasiticide. Useful in ringworm, hard and horny warts, and corns.

Pharmacology.

Externally.—Copper sulphate has no action on the unbroken skin, but is a **caustic** when applied to a raw surface or a delicate mucous membrane, such as that of the conjunctiva. In diluted solutions it constricts local blood-vessels, and it is therefore a **local astringent.**

Internally. **Gastro-intestinal tract.**—It combines with the tartar of the base of the teeth, when long continued, and causes a characteristic green line. This line is not in the gums themselves as it is in Plumbism. In small medicinal doses, it acts as an **astringent,** and in large doses 5 to 10 grs., as an **emetic** like zinc sulphate. Emesis is caused partly by its direct local action on the stomach, and partly by stimulation of the vomiting centre. It causes little depression and nausea. If it fails to induce vomiting, the stomach must be quickly emptied by other means, otherwise **gastro-enteritis** may result.

Remote Action.—In minute doses copper sulphate is absorbed as an albuminate, and is said to act on the body like arsenic. It promotes assimilation and increases strength and flesh. Hence it is an **alterative** and **nervine tonic.** It paralyses the cardiac

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

and the respiratory centres. During elimination through the intestinal mucous membrane, it acts as a **remote astringent.** It is stored in the liver.

Elimination.—Copper salts are thrown off by the gastro-intestinal mucous membrane, bile, urine, saliva, and sweat.

Acute toxic action is rare. In large doses copper salts produce violent gastro-intestinal irritation, with paralysis of the cardiac and respiratory centres.

Antidotes.—Emetics or stomach-pump if there is no free vomiting; white of egg, milk or demulcent drinks, yellow prussiate of potassium, followed by opium and a warm poultice over the stomach.

Chronic toxic action.—Workers in copper or brass may suffer from anæmia, headache, debility, emaciation, indigestion, tremors, laryngeal and pharyngeal catarrh, occasional hæmoptysis, salivation, a green line at the bases of the teeth and occasional colic. In short a condition not unlike that of lead-poisoning.

THERAPEUTICS.

Externally.—Copper sulphate is used to destroy **exuberant granulations,** and to stimulate **indolent ulcers.** Being not so strong as silver nitrate, it causes less pain when applied to **granular lids,** and to the edges of the eye-lids in **tinea tarsi.** In the form of a lotion (½ to 4 grs. to 1 oz.) it is very serviceable in **sluggish ulcers** and **chancres**; and as an injection in **gonorrhœa, gleet** and **leucorrhœa,** but it must be remembered that copper lotions are more powerful than those of zinc sulphate.

Internally.—It is chiefly used for its **astringent** properties in **obstinate dysentery, and severe diarrhœa,** especially that of tuberculosis. For its **emetic** action, it is occasionally used in narcotic poisoning, and to expel false membranes or mucus from the air passages in **diphtheria, laryngitis, croup** and **bronchitis,** especially where ipecacuanha fails. It is a valuable **antidote in poisoning by phosphorus,** for copper is deposited over phosphorus which is rendered inert. 3 grs. of copper sulphate should be given every few minutes until vomiting is induced and then a saline laxative. As a tonic it has been given in **epilepsy,** but without much success. It is said to cure **chlorosis.**

CUSPARIÆ CORTEX.

Cusparia Bark. N.O. *Rutaceæ.*

Syn.—Angustura bark.

Habitat.—Tropical South America.

Source.—The dried bark of *Cusparia febrifuga.*

Characters.—In flattened or curved pieces or quills, 4 or 5 in. long, 1 in. wide, ½ in. thick. Outer layer grey or yellowish corky which can be removed, disclosing a hard, dark-brown inner layer. Inner surface light-brown and laminated. Fracture short, resinous, showing white points. Odour musty. Taste bitter. *Impurity.*—Bark of *Strychnos Nux*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Vomica (false angustura bark), whose inner surface gives a bright blood-red colour with HNO_3 indicating *brucine* ; whilst cusparia bark does not.

Composition.—(1) *Cusparine* or *Angusturine*, a crystalline bitter alkaloid. (2) *Galipeine*, an alkaloid. (3) *Galipidene*, an alkaloid. (4) *Cusparidine*, also an alkaloid. (5) An *Aromatic Oil*. No tannin.

Incompatibles.—Mineral acids and metallic salts.

Action.—Bitter tonic.

Official Preparations.

1. **Infusum Cuspariæ.**—1 in 20 (½ hour). **B. P. Dose.**—1 to 2 ozs.
2. **Liquor Cuspariæ Concentratus.**—1 in 2. **B. P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

Cusparia is used to make Angustura Bitters. It has **aromatic, tonic** and **febrifuge** properties, and in large doses produces gastro-intestinal irritation. It is useful in **tropical fevers**, especially **intermittents**, and in **dysentery**. It is largely employed in South America.

CUSSO. Kousso.

N. O. *Rosaceæ*.

Habitat.—Abyssinia.

Source.—The dried panicles of pistillate flowers of *Brayera anthelmintica*.

Characters.—In cylindrical rolls, 1 to 2 ft. long. The panicles much branched, the branches arising from the axils of large sheathing bracts, covered with hairs and glands. Flowers numerous, small, shortly stalked, unisexual, with two roundish membranous veined bracts at the base. Calyx hairy, veined, with two whorls of 5 segments each. No odour. Taste bitter, acrid.

Composition.—(1) *Koussin*, a neutral active principle. (2) *Oil, Gum, Resin* and *Tannic Acid*.

Action.—Anthelmintic for tapeworm. **B.P. Dose.**—¼ to ½ oz.

Pharmacology and Therapeutics.

In official doses kousso is a valuable **anthelmintic** for all three varieties of tapeworm which are readily killed by it. It is not much used either in this country or in England. In large doses it causes vomiting and slight diarrhœa.

The powdered flower in compressed masses or suspended in an aromatic water is more efficacious than the infusion. The action of kousso is more certain when given on an empty stomach and followed by an aperient. The entozoa are expelled dead, and sometimes in pieces. The infusion may be prepared by boiling 2 to 4 drs. of the flower in 4 ozs. of boiling water for ½ hour. It should not be strained.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

DATURÆ FOLIA.

Datura leaves. N. O. *Solanaceæ.*

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern and West Indian Colonies.

Source.—The dried leaves of *Datura fastuosa*, and of *Datura Metel.*

Characters.—Ovate, acuminate, with long petioles and sinuate-dentate margins. 7 to 8 in. long, 4 to 5 in. broad. Odour characteristic. Taste bitter.

DATURÆ SEMINA. Datura Seeds.

(*Ind. and Col. Addendum*).

Source.—The dried seeds of *Datura fastuosa.*

Characters.—Wedge-shaped ; rounded, thickened, furrowed, wavy margins, compressed laterally ; $\frac{1}{8}$ to $\frac{1}{6}$ in. broad, $\frac{1}{12}$ in. thick. Hilum on one edge. Testa finely pitted, reticulated. Taste bitter.

Official Preparation.

1. **Tinctura Daturæ Seminum.**—Seeds bruised 5 ozs., Alcohol (70 p.c.) *q s.* to 1 pint. By percolation. **B.P. Dose.**—5 to 15 ms.

Pharmacology and Therapeutics.

The action and uses of the leaves and seeds are the same as those of stramonium leaves and seeds (*q.v.*).

DIGITALIS FOLIA.

Digitalis Leaves. N.O. *Scrofulariaceæ.*

Habitat.—Britain.

Source.—The dried leaves of *Digitalis purpurea*, the Purple Foxglove, collected from plants commencing to flower.

Characters.—4 to 12 in. long up to 6 in. broad, with a winged petiole, ovate or ovate-lanceolate, subacute, crenate. Upper surface somewhat rugose, dull green, slightly hairy. Under surface paler, pubescent, with prominent veins. No odour. Taste very bitter.

Identification.—The crenate-dentate margin and the prominent white net-work of veins on the under surface at once enable a student to recognise it. The latter character may help him to make it out even when in fragments.

Composition.—Five active principle (all glucosides).—(1) *Digitonin*, (2) *Digitalein*, (3) *Digitalin*, (4) *Digitoxin*, (5) *Digitin.* Two acids—(1) *Digitalic* and (2) *Antirrhinic.* Other constituents, as a *starch*, *colouring matter*, *gum*, *tannin*, *volatile oil*, *salts* and *sugar.*

Incompatibles.—Iron persalts, lead acetate, cinchona. In practice it is often given with iron and cinchona.

Action.—Cardiac tonic, diuretic. **B.P. Dose.**—$\frac{1}{2}$ to 2 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparations.

1. **Infusum Digitalis.**—1 in 140 nearly. Contains more digitonin which is allied to saponin, and is therefore a more active diuretic.
B.P. Dose.—2 to 4 drs.
2. **Tinctura Digitalis.**—1 in 8. Dark-brown.
B.P. Dose.—5 to 15 ms.

Non-Official Preparatoins.

1. **Inf. Digitalis. B.P.C.**—Leaves 480 grs., Alcohol (90 p.c.) 5 ozs., Water *q s.* to 1 pint. Thrice macerated. Has 8 times the strength of Inf. digitalis. *Dose.*—15 to 30 ms.
2. **Pil. Hyd. et Digit. Comp. St. Bart.**—Mercurial pill 1 gr., Digitalis 1 gr., Squill 1 gr., Ext. of Henbane 2 grs.
3. **Succus Digitalis. B.P.C.**—Juice 3, Alcohol (90 p.c.) 1.
Dose.—5 to 15 ms.
4. **Digitalin.**—Under this name 4 varieties are found in the market.—
(*a*) **Amorphous Digitalin** (*Homolle*).—Is of uncertain composition and is not much used now. *Dose.*—$\frac{1}{60}$ to $\frac{1}{16}$ gr. in granules.
(*b*) **Crystalised Digitalin** (*Nativelle*).—Consists mostly of digitoxin in light-white needles, soluble in chloroform, insoluble in water. Is cumulative. *Dose.*—$\frac{1}{250}$ to $\frac{1}{60}$ gr. in pill.
(*c*) **German Digitalin.**—Consists mostly of digitalein, with some digitonin and digitalin. Amorphous, soluble in water. *Is most suitable for hypodermic use. Dose.*—$\frac{1}{60}$ to $\frac{1}{30}$ gr.
(*d*) **Pure Digitalin.**—A crystalline glucoside. Soluble 1 in 1000 of water. *Dose.*—$\frac{1}{250}$ to $\frac{1}{160}$ gr. hypodermically.
5. **Digitoxin** (*Merck*).—In minute white crystals. Recent investigators consider it to be the active principle. *Dose.*—$\frac{1}{250}$ to $\frac{1}{60}$ gr. Best given in solution in glycero-alcohols.

Pharmacology.

Externally.—The leaves gently irritate the skin. The writer has seen a case in which mild toxic symptoms were produced by their application to the inflamed scrotum after they had been softened by soaking in hot water.

Internally. **Gastro-intestinal canal.**—Small doses appear to have no action. Large and continued doses induce vomiting and purging. Digitalis is therefore a **mild gastro-intestinal irritant.**

Blood.—Its active principles are readily absorbed, but they are not known to affect the blood.

Heart.—Digitalis acts both on the heart, and on the blood-vessels It (1) **slows the beat of the heart,** (2) **increases the force of the systole,** and (3) **lengthens the diastole** without affecting the duration of systole. Consequently the **pulse** is slowed and steadied and its tone is improved. Digitalis therefore is of therapeutic value in several different ways—(*a*) The slowing of the heart allows the left ventricle to be better filled and a larger wave of blood sent into the aorta,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*b*) it removes "water-logging" of the venous system,
(*c*) it lessens pulmonary engorgement,
(*d*) it checks mitral regurgitation in cases of valvular lesion. Further Dr. Hare has shown by administering digitalis to young pigs for four-and-a-half months, that there are genuine growth and hypertrophy of the cardiac muscle as well **an increase in the weight of the organ.** It has also been observed that in small doses digitalis actually **increases the amount of work** done in a given time, *i.e.*, a greater output with each ventricular contraction.

The action of digitalis on the heart is very complicated, and is chiefly due to (1) the **direct action** of digitalis on the **involuntary muscular fibre** of the heart, (2) **increased activity of the inhibitory fibres of the vagus,** and (3) partly to the **stimulation of the vagal centre.** According to Cushny the vagal action commences a little before the muscular.

Blood vessels.—In moderate doses digitalis greatly **increases the blood-pressure,** caused partly by the **greater cardiac force,** and partly by the **contraction of the arterioles,** from its direct action on their **involuntary muscular fibre,** and perhaps on the nervous apparatus (?) contained in the arteries, as has been pointed out by Brunton. The **vasomotor centres** in the **medulla** and **cord** are also slightly stimulated by digitalis, and this, to a certain extent, contributes to the rise of the blood-pressure. In toxic doses digitalis paralyses the vagal and other centres, as well as the muscular coat of the arterioles, and therefore the blood-pressure falls from the relaxation of the vessels.

The action of digitalis on the blood-pressure of an animal, as is seen from a tracing taken by Dr. Tuncliffe, may fairly be divided into four stages thus :—

First.—Slowing of the heart (pulse), rise of the blood-pressure, and greater oscillations due to the action of digitalis on the heart and contraction of the arterioles.

Second.—Very rapid pulse and still high blood-pressure, due to the depression of the vagus; the contraction of the arterioles being maintained.

Third.—Still rapid pulse, beginning of the relaxation of the vessels, and falling of the blood-pressure.

Fourth.—Further diminution of the pressure, weakening and again slowing of the pulse, from the paralysis of the heart. (See Action of Medicines by Brunton, 1901, p. 313).

From what has just been stated it becomes evident that the pulse alters materially in character with the amount of the drug administered. It becomes at first slow, then gradually intermittent, then more frequent though still intermittent and lastly rapid but fairly regular. The effects pass off in the reverse order.

Respiration.—This is only secondarily affected from imperfect circulation in toxic doses.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Temperature.—In medicinal doses it has no influence on the temperature, but in toxic doses it reduces it even in health. How this occurs we do not know.

Nervous system.—In medicinal doses it has no influence on the brain, cord, and sensory and motor nerves. In large doses it causes giddiness, headache, dimness of sight and disturbed hearing. Flashes of light, and a blue halo around bright objects also appear before the eyes. All these symptoms are probably due to some disturbance in the cerebral circulation. The reflex excitability and motor nerves are depressed only by toxic doses.

Kidney.—The action of digitalis on this organ is uncertain. In health, it may or may not cause diuresis. Lauder Brunton by experiments on his own person has found "while small doses have little or no action, marked diuresis occurs when the drug is pushed so as to produce symptoms of poisoning." But. other observers have obtained different results. In heart disease it very often acts as a powerful **diuretic**, though not always so. The cause of this uncertainty of action may be explained, if we accept the theory that if the arterioles of the kidneys like the rest of the body are tightly contracted, very little blood will flow through them and therefore little urine will be secreted; but, if on the other hand, the renal vessels are not so much contracted, the increased cardiac force and the rise of the blood-pressure will drive more blood to the kidney, and there will consequently be a free diuresis. Some consider that in small doses, the vessels of the kidney are constricted along with the rest of the body, and the quanity of urine secreted is therefore diminished. But as the renal arterioles are the first to dilate while the general blood-pressure is still high, free diuresis ensues. Kobert has shown that digitalin contracts all vessels while digitoxin and digitalein dilate the renal vessels while contracting all others. It is a known fact that the leaves which contain more digitonin (see p. 379) are most powerfully diuretic.

It has no action, as far as we know, on the composition of the urine.

Uterus.—The muscular fibres are supposed to be stimulated to contraction.

Cumulative action.—Digitalis when given for a long time, sometimes suddenly causes symptoms of poisoning even when its dose has not been increased. This is known as the **cumulative effect of the drug**, and is due to the retardation of its excretion by the kidneys from the contraction of the renal vessels. The active principles, not being eliminated as fast as they are absorbed, accumulate in the system. The first indication of this cumulative action is scanty secretion of urine.

Elimination.—It is chiefly excreted by the kidneys and partly by the gastro-intestinal mucous membrane.

Toxic action.—Large doses cause nausea, vomiting and purging;

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the vomit is grass-green, the change in colour being probably due to the action of gastric juice on some ingredients of digitalis. The other symptoms have already been described.

Antidotes.—Emetics or pump. Strong coffee, or tannin in solution and in large draughts. Stimulants—brandy, whisky, ammonia, &c. Warmth to the extremities. Aconite (5 ms. of tincture), or aconitine $\frac{1}{100}$ gr. hypodermically. Opium. Absolute rest and *recumbent position* are essential.

Physiological antagonists.—Aconitine, muscarine, scoparin, and saponin. Aconite is practically the only one of these that is used as an antidote. We therefore append a table showing the comparative antagonism between digitalis and aconite.

Digitalis.	Aconite.
1. A powerful cardiac tonic. The force of cardiac contraction is increased.	A powerful cardiac sedative. The force of cardiac contraction is diminished.
2. The arterial tension is increased from contraction of the vessels.	The arterial tension is diminished from relaxation of the vessels.
3. The blood-pressure rises considerably.	The blood-pressure falls considerably.
4. A powerful diuretic in certain tain conditions.	A feeble diuretic in certain conditions.

Resemblance of action.—The following drugs more or less resemble digitalis in action on the circulatory system :—Strophanthus, erythrophlœum (casca bark), adonis vernalis, convallaria majalis, cactus grandiflora, scillain (scilla), sparteine (broom), heleborein (helleborus niger), and barium chloride.

THERAPEUTICS.

Externally.—Poultices of digitalis leaves are occasionally used in cases of supression of urine, but it is doubtful whether they are of any real value.

Internally —It is the most valuable remedy we have for certain diseases of the heart ; it affords relief, according to Ringer, in one or more of the following ways :—

1. By strengthening the action of a weak heart.
2. By reducing the strength of the beats of a heart acting too powerfully.
3. By lessening the frequency of the heart's beats.
4. By correcting irregular action of the heart.
5. By increasing tonicity and so lessening the size of the cavities of the heart, thereby obviating the condition of over-distension in which the stretched ventricles are unable to contract upon their contents, a condition threatening complete asystole.

Mitral regurgitation and constriction.—Digitalis has a wonderful influence in restoring a **dilated and weakened ventricle** to a state of efficiency. Under its use a quick, weak and irregular contraction becomes slower, stronger and regular. As the **diastolic period is prolonged**, the heart gets more

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

time for nutritive repair, and for more efficient subsequent contraction, from the flowing in of more blood from the dilated auricle and right side of the heart. By its powerful **diuretic action**, and **lessened pressure in the pulmonary circulation**, digitalis relieves dyspnœa, cough, venous engorgement of the lungs and of the abdominal organs, œdema, dropsy and many other symptoms due to mitral regurgitation. In short, digitalis is pre-eminently suited for cases of the "water-logged" type. It equally benefits **mitral constriction** by lengthening the period of diastole, and thereby allowing the normal amount of blood to pass through the constricted orifice. In proportion as this object is gained, the urgent symptoms are relieved. Dr. Hare has shown that it causes hypertrophy of the heart. It is therefore of great value in restoring the balance of the circulation in cases of ruptured compensation.

Tricupsid regurgitation and constriction.—Digitalis acts fairly well in diseases of the tricuspid valves, though not so well as in those of the mitral.

Aortic regurgitation and obstruction.—In the first stage of **aortic regurgitation**, digitalis is **useless** or sometimes positively **harmful**; but in the second stage, when the ventricle dilates, and the auriculo-ventricular orifice enlarges, producing **secondary mitral regurgitation**, digitalis then becomes of great value. But even then it must be given with great caution, for sudden syncope may occur if the patient does not keep to his bed. Cases of pure **obstruction** do not require any drugs, as compensatory hypertrophy may gradually take place without them. But when we wish to increase the contractile force of the heart in order to drive more blood through the obstructed aorta, or when from such an obstruction mitral disease has set in, digitalis in small doses does immense good. Unfortunately aortic obstruction is generally accompanied by aortic regurgitation; hence the difficulty of using digitalis.

Fatty heart.—Digitalis should not be given in **fatty degeneration of the heart**, as the increased force of systole, may lead to rupture of the degenerated muscular fibres.

Other cardiac diseases.—In many primary diseases of the muscular structure, such as acute or chronic **myocarditis**, with or without vegetative growths, **pericarditis, endocarditis** with or without valvular lesions, digitalis helps to quiet and regulate the action of the heart. Many **functional diseases of the heart**, such as palpitation, irregular cardiac beat due to dyspepsia are benefited by digitalis, but it must be used with caution as it may bring on indigestion In many **irritable conditions of the heart**, especially in persons who take excessively hard exercise, such as rowing or long marches with heavy knapsacks, or in persons of a neurotic temperament, digitalis is considered highly beneficial. The **dilatation** of the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

right side of the heart which so often accompanies chronic diseases of the lungs is also relieved by digitalis.

Renal diseases.—It is not safe to use digitalis in **acute Bright's disease** even as a diuretic, as it is not sound therapeutics to dilate the blood vessels of an acutely inflamed organ; but when the kidney has become granular and the compensatory hypertrophy of the heart has not been sufficient to overcome the peripheral resistance, and ventricular dilatation and mitral regurgitation have set in, digitalis—especially the Guy's pill (digitalis, squill and blue pill each 1 gr.)—is of signal service. With this exception, digitalis is positively harmful in chronic Bright's disease, as it increases the arterial tension which is already too high and may cause cerebral hæmorrhage.

Nervous diseases.—In **sleeplessness** at night followed by drowsiness in the day, in anæmic patients, digitalis may act as a **hypnotic** by restoring tone to the relaxed vessels. In moderate doses digitalis is said to be useful in **chronic delirium tremens**, but enormous doses (½ oz. of the tincture) as recommended by Jones are not safe.

Febrile and other diseases.—Digitalis is no longer used as a cardiac sedative, but as an antipyretic it is still occasionally used on the Continent. To tone up and slow the excessive action of the heart, digitalis is often prescribed in low forms of **remittent, intermittent, typhoid, scarlet and rheumatic fevers.** In **pneumonia** many advocate its use in larger doses, and its value as an adjunct to other treatment when given in moderate doses, has long been recognised. In **pleurisy**, when the heart becomes embarrassed by the effused fluid, the writer often uses the infusion as a cardiac tonic and diuretic.

Exophthalmic goitre.—Whether given alone or with iron and quinine, digitalis is considered to be a valuable medicine in this disease.

Hæmorrhage.—It is impossible to measure that stage in the action of digitalis, which only causes contraction of the arterioles without increasing blood-pressure. However, it is given in **epistaxis** and **hæmoptysis**. In **pulmonary hæmorrhage** due to valvular disease, it is very useful. In **menorrhagia** it may be usefully employed, as it tends to contract the uterine blood-vessels, but in hæmorrhage from a **fungoid growth** in the cervix, it is entirely useless.

Caution.—(1) Suspend the administration, or reduce the dose, of digitalis on the first appearance of vomiting, or of a tendency to fainting, or of diminution in the secretion of urine.

(2) Never continue the digitalis treatment without intermission. After a week or ten days' use stop it for three or four days. When it is desirable to maintain the action on the heart, some other cardiac tonics, such as strophanthus, may be used alternately with digitalis.

(3) Never use digitalis in large doses unless you can see your patient very frequently, especially when the drug requires to be continued long.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(4) Always enjoin a perfectly **recumbent position** during a course of digitalis treatment. Never allow your patient to get out of bed even to pass water or stools, or to sit up, particularly in a case of aortic regurgitation, lest there should be sudden fatal syncope.

(5) Never use digitalis if the vessels are **atheromatous**, or in a case of advanced Bright's disease, or of fatty heart.

(6) Examine the urine from time to time to ascertain the eliminatory functions of the kidneys.

Prescribing hints.—The fresh infusion and the tincture are the most reliable preparations. When the kidneys are to be acted upon, the infusion is to be preferred. (See p. 379). Though incompatible with iron on account of the tannin it contains, digitalis is often advantageously given with iron; but, if this combination is used, the resulting inky, ugly mixture should be cleared and made elegant by the addition of diluted phosphoric acid. When the full effects of digitalis are desired, the leaf may be prescribed either in powder or pill, as in Niemeyer's pill (digitalis ½ gr., quinine 1 gr., opium ¼ gr.)

ELATERIUM. Elaterium.

N. O. *Cucurbitaceæ.*

Syn.—The squirting cucumber. **Syn. B.P. '85.**—Ext. Elaterii.

Habitat—Britain (cultivated.)

Source.—A sediment from the juice of the fruit of *Ecballium elaterium.*

Characters.—In light, friable, flat or slightly curved opaque cakes, $\frac{1}{10}$ in. thick, pale-green or yellowish-grey. Odour faint, tea-like. Taste bitter, acrid. *Impurities.*—Starch, flour, chalk.

Identification.—It is easily recognised, as no other drug resembles it. The student should not taste it.

Composition.—(1) *Elaterin* (*off*) (2) *Prophetin*, a glucoside. (3) *Gummy Matter.* (The official elaterium should contain 25 to 20 p.c. of elaterin).

Action.—A powerful hydragogue purgative.

B.P. Dose.—$\frac{1}{10}$ to ½ gr.

ELATERINUM. Elaterin.

$C_{20}H_{28}O_5$.

Source.—The active principle of elaterium.

Characters.—In small hexagonal scales, having a bitter taste, colourless, soluble in chloroform. **B.P. Dose.**—$\frac{1}{10}$ to $\frac{1}{10}$ gr.

Official Preparation.

1. **Pulvis Elaterini Compositus.**—1 in 40. **B.P. Dose.**—1 to 4 grs.

Pharmacology.

Internally.—The action of elaterium is identical with that of colocynth, except that it is much more powerful (see p. 360). It

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

produces numerous watery evacuations with considerable griping and prostration, and sometimes nausea, due to the strong stimulation of the glands and muscular coat of the intestines and of the liver. In large doses it causes **violent gastro-intestinal irritation** and occasionally even **peritonitis**. It must mix with the bile before it can operate. It is therefore next to croton oil the most **powerful hydragogue purgative** in the B.P. It increases salivary secretion and when hypodermically injected it not only purges, but, according to Brunton, causes tetanus and dyspnœa.

THERAPEUTICS.

Internally.—Being a *violent drastic hydragogue purgative*, its use is indicated in cases when we want immediate copious evacuations of the bowels, as in **apoplexy, uræmia, œdema** of the **lungs**, &c. For the same reason it is largely employed in renal, hepatic and cardiac **dropsies**, as in **Bright's disease, cirrhosis** of the **liver**, and **mitral regurgitation.** It is rarely given in constipation.

Caution.—It should not be given to the weak, the old, the pregnant, and to those who suffer from habitual diarrhœa, chronic dysentery, piles, prolapse of the rectum, or cardiac weakness.

Prescribing hints.—The initial dose of elaterium should never exceed $\frac{1}{8}$ gr. and that of elaterin $\frac{1}{20}$ gr. Henbane and aromatic oils correct their griping property. The student should particularly remember the doses of the two drugs, and should not confound elaterium with elaterin. The compound elaterin powder is a safe preparation and may be given in powder or pill. If given in powder, it is better to mix it with butter and to put it on the back of the tongue, to be washed down with a spoonful of water. Elaterium does not keep well in hot climates, and for that reason many of the samples that are found in the Indian market are almost inert.

EMBELIA. Embelia.

N. O. *Myrsineæ* (*Ind. and Col. Addendum.*)

Syn. I V.—*Biranga* Beng. *Babeŕdng* Hind. *Vidanga*, Sans.

Habitat—India, Eastern Colonies.

Source.—The fruit of *Embelia ribes*, and of *Embelia robusta.*

Characters.—Globular, $\frac{1}{4}$ in. in diameter, dull red with dark spots to nearly black, containing a horny reddish seed. Taste slightly astringent, aromatic.

Composition.—(1) *Embelic acid* forming salts with ammonium, potassium and sodium.

B.P. Dose—1 to 4 drs. in powder.

NON-OFFICIAL PREPARATION.

1. **Ammonii Embelas.**—In crystalline red needles. *Dose.*—3 to 6 grs. in honey or syrup.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY AND THERAPEUTICS.

These berries are considered a valuable **anthelmintic** for **tapeworm**, and may be used in powder or in infusion (without straining) for the same disease in India and Eastern Colonies. The taste is not unpleasant and the directions are the same as those given for the administration of cusso (see p. 377) or melon pumpkin seeds.

ERGOTA. Ergot.

N.O. *Fungi* and *Graminaceæ*.

Syn.—Secale Cornutum, Ergot of Rye.

Habitat.—Spain and Russia. (The Spanish Ergot is the best.)

Source—The Sclerotium (mycelium or spawn) of *Claviceps purpurea* (N.O. *Fungi*), originating in the ovary of *Secale cereale*, the common rye (N. O. *Graminaceæ*). (Ergot is the diseased rye filled with the mycelium of a small fungus).

Characters.—Subcylindrical or somewhat triangular, tapering, curved, ½ to 1½ in. longitudinally furrowed, more on the concave side. Cracked, violet-black externally, pinkish-white within. Odour peculiar, disagreeable, especially if triturated with solution of potassium hydroxide. *Impurity.*—Musty ergot.

Identification.—The peculiar appearance and the odour are enough to identify it. The powder has a greyish brown colour and a characteristic smell, though not infrequently this is disguised by that of camphor (see below).

Composition.—*Sphacelinic acid* (its physiological activity is due to a body called sphacelo-toxin). (2) *Cornutine*, an alkaloid insoluble in water. (3) *Ergotinic acid*, a glucoside. (4) *Ergotinin*. (5) A *fixed oil*, 30 p.c. (6) *Trimethylamine*, which gives the odour. (7) *Tannin*, *colouring matter*, &c. (Its composition is as yet unknown).

Incompatibles.—Metallic salts, astringents.

Dispensing hints.—The entire ergot should be carefully dried over quicklime, not by heat, and kept in perfectly dry air-tight bottles (see p. 7) with a little camphor, in order to preserve it from insects. The powdered drug deteriorates very rapidly.

Action.—Ecbolic, general hæmostatic. **B.P. Dose.**—20 to 60 grs.

OFFICIAL PREPARATIONS.

1. **Extractum Ergotæ.** *Syn.*—*Ergotin.*—**B.P. Dose.**—2 to 8 grs. in capsules.
2. **Extractum Ergotæ Liquidum.**—1 in 1. **B.P. Dose.**—10 to 30 ms.
3. **Infusum Ergotæ.**—1 in 20. **B.P. Dose.**—1 to 2 ozs.
4. **Injectio Ergotæ Hypodermica.** *Syn.*—*Hypodermic Injection of Ergotin.*—1 in 3. **B.P. Dose.**—3 to 10 ms. hypodermically.
5. **Tinctura Ergotæ Ammoniata.**—1 in 4. **B.P. Dose.**—½ to 1 dr. (Ammonia exhausts ergot more efficiently. Kobert prefers an acid (HCl) exhaustive).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparations.

1. **Acid. Scleroticum.** *Syn.—Sclerotinic Acid.*—A very active preparation. *Dose.*—½ to ¾ gr. hypodermically.

2. **Cornutine** (*Kobert*).—Brownish-grey, amorphous. An efficient hæmostatic. *Dose.*—⅛ to ¼ gr. daily in divided doses. The **hydrochloride** and the **citrate** salts are more soluble.

3. **Ergotinina.** *Syn.—Ergotinine.*—An alkaloid in minute white crystals, insoluble in water, but soluble in alcohol and chloroform. *Dose.*—$\frac{1}{100}$ to $\frac{1}{50}$ gr. **Hypodermic injection.**—Ergotinine 1 gr., Lactic Acid 2 ms., Chloroform Water 1,000 ms. *Dose.*—5 to 10 ms.

4. **Ergotininæ Citras.**—A greyish powder. Soluble. *Dose.*—$\frac{1}{150}$ to $\frac{1}{30}$ gr.

5. **Liquor Ergotæ Aceticus.** *Syn.—Extractum Ergotæ Fluidum U. G.*—Contains 2 % of acetic acid, with dilute alcohol as a solvent. *Dose.*—10 to 60 ms.

6. **Liq. Ergotæ Ammon.**—1 in 1. An efficient and reliable preparation. *Dose.*—10 to 60 ms.

Pharmacology.

Internally. **Gastro-intestinal canal.**—Ergot has a disagreeable bitter taste and increases **salivary secretion**. In moderate doses it stimulates the involuntary muscles of the intestine, sometimes so strongly as to cause looseness of the bowels. In large doses it is a **gastro-intestinal irritant.**

Blood.—Its active principles readily enter the blood, but do not seem to affect its constitution.

Heart.—Ergot **depresses the cardiac muscle** and therefore slows the rate of the pulse. This slowing is due to the stimulation of the vagal terminal ends, since this does not occur if atropine is given before the administration of ergot. Consequently the **blood-pressure falls** at first.

Blood-vessels.—Very soon the **blood-pressure rises** from the **powerful contraction of the arterioles** all over the body, owing largely to its direct action on the involuntary muscular fibre in the arteries, and partly to the stimulation of the vaso-motor centres in the cord. Even the veins to some extent participate in this contraction. On account of the general vascular contraction together with the thickening of their walls produced by the sphacelinic acid, the coagulation of blood from a ruptured blood-vessel is greatly promoted; and ergot therefore acts as a powerful **general hæmostatic.** If this action continues long, **gangrene** may set in different parts of the body, leading to **"gangrenous ergotism."** (see p. 389). Toxic doses paralyse the vaso-motor centres and the cardiac muscle, thereby producing a fall of the **blood-pressure.**

Respiration.—Ergot slows respiration. Death occurs from asphyxia caused by the spasm and weakness of the respiratory muscles.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Nervous system—It has little effect on the brain. The highest centres are not affected by medicinal doses, nor even by a single large dose. It produces changes of a sclerotic nature especially in the postero-external columns of the cord, and induces when it is given for a long time, a train of symptoms which are known as "Spasmodic ergotism."

Uterus—Ergot powerfully contracts the impregnated uterus of women and of lower animals, especially when in labour, thereby expelling its contents. Hence it is a powerfull **ecbolic**. But the contractions are more frequent than the normal ones and also more prolonged and irregular. In large doses it causes tetanic spasms. It is doubtful whether it acts at all as an **abortefacient**, since it cannot cause contraction of the uterus, unless labour has commenced. Upon the unimpregnated uterus, it has little or no action. This action is probably due to the direct stimulation of the unstriped muscle of the womb, and partly to the stimulation of the uterine centre in the cord.

Secretion.—The secretion of saliva, sweat, milk and urine is diminished, probably from the disturbance of the local blood supply to the glands by the general vascular contraction.

Chronic toxic action or Ergotism.—Poisoning by ergot rarely occurs when used medicinally, but it is very frequently seen amongst the poor, who live on diseased rye. It then shows itself under one or other of the two forms described below :—

1. **Gangrenous Ergotism.**—Various parts of the body especially the extremities suffer from imperfect blood supply, owing to the contraction and thickening of the walls of the blood vessels, (see p. 388) thereby leading to a process of gangrene. It should not be mistaken for **pellagra**, a disease characterised by indolent ulcers on the skin, brought on by the use of diseased maize ; or for **Raynaud's Disease**.

2. **Spasmodic Ergotism.**—In this variety, the patient first feels a sensation of itching, of tingling, and of insects crawling over the body, followed by a sensation of **numbness** and of **local anæsthesia**. These symptoms appear first in the hands and feet, then spread over the body. The sensory impairment is soon followed by signs of motor irritation, such as **tonic contraction** of the muscles especially of the extremities ; and later on by the development of a **staggering gait**. Vomiting and diarrhœa often accompany this variety, and dimness of sight, loss of hearing and epileptiform convulsions are occasionally present.

It should not be confounded with **lathyrism**, palsy of the lower extremities caused by the use of chick-pea (*Lathyrus sativus* and *Lathyrus cicera*) as the only article of food.

THERAPEUTICS.

Externally.—A hypodermic injection of ergotin has sometimes been found useful in curing **goitres** and **aneurisms** when injected into the parts around the sac. Ergotin 3 grs, injected every two or three days either into the sphincter or the prolapsed gut itself is said to cure **prolapse of the rectum**.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Internally—As a *general hæmostatic* it has not entirely lost its reputation and is still largely used in internal hæmorrhages such as **epistaxis, hæmoptysis, hæmatemesis, hæmaturia,** &c. In urgent cases ergotin should be deeply or subcutaneously injected every fifteen to thirty minutes. It is the most valuable remedy we have in **post-partum hæmorrhage.** In multiparas who are often subject to this sort of bleeding, it is a wise plan to administer ergot just after the birth of the fœtus, or even before its birth if there be no contra-indication to its administration. In urgent cases the ammoniated tincture or the liquid extract may be given in 1 or 2 drs., or the official hypodermic injection in 10 ms. doses very frequently. Good results have also been seen in **menorrhagia** and in **bleeding** from various forms of **uterine fibroids.** In fibroids, ergotin should be injected into the lip of the os.

On account of its *constringent effect* on the vessels, ergot has occasionally been employed in **purpura, dysentery, enlargement** of the **spleen, spinal sclerosis, excessive sweating, diabetes insipidus,** &c.

It is said to be useful in **obstinate chronic constipation** when combined with other purgatives. It acts probably by stimulating intestinal peristalsis.

As an *ecbolic*, ergot should be given with great caution. Its use should be confined to those *cases* of *uterine inertia in which there is no mechanical obstruction to the passage of the child*; otherwise the child's life may be endangered by the prolonged tonic contraction of the uterus, or if the resistence is too great, it may cause rupture of that organ. Hence ergot should not be given *until after the expulsion of the placenta*, when it ensures firm contraction of the uterus and prevents post-partum hæmorrhage.

Prescribing hints.—Ergot is not a powerful poison. An ounce of the liquid extract has been given in one dose without toxic effects. The fresh infusion and the ammoniated preparations are the most reliable. The unpleasant taste of ergot is best covered by chloroform water, and tincture of orange. The inky mixture which results when the liquid extract is ordered with perchloride of iron can be clarified by the addition of a little citric acid. Ergotin may be given in pill (see p. 88) or capsule. The deep muscles of the buttock should be selected for hypodermic injection, but not the abdominal wall. The subcutaneous injection is often followed by inflammation and abscesses.

EUCALYPTI GUMMI.

Eucalyptus Gum. N. O. *Myrtaceæ.*

Habitat.—Australia. Cultivated in India on the Nilgiris.

Source.—A ruby-coloured exudation, or so called Red Gum, from the bark of *Eucalyptus rostrata* and some other species of *Eucalyptus.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—In grains or small masses. Thin fragments are transparent ruby-red. Tough. Taste astringent. When chewed adheres to the teeth and tinges the saliva red. *Solubility.*—80 to 90 p.c. in cold water, entirely in alcohol (90 p.c.). *Impurity.*—Australian kino.

Identification.—It resembles kino, which is darker and feebly soluble in water.

Composition.—(1) *Kinotannic acid.* (2) *Catechin.* (3) *Pyrocatechin.*

Action.—A powerful astringent. **B.P. Dose.**—2 to 5 grs.

Official Preparation.

1. **Trochiscus Eucalypti Gummi.**—1 gr. in each.

Non-Official Preparations.

1. **Decoc. Eucalyp. Gummi.**—1 in 40. Boil till dissolved. As a gargle, and in diarrhœa. *Dose.*—2 to 4 drs.
2. **Ext. Eucalyp. Gum. Liq. B.P.C.**—Gum 5 ozs., Alcohol (90 p.c.) 2 ozs., water *q.s.* to 1 pint. *Dose.*—½ to 1 dr.
3. **Syr. Eucalyp. Gummi.**—Liquid extract 20, sugar 12, dissolve. *Dose.*—½ to 1 dr.
4. **Insufflatio Eucalypti Gummi.**—Equal parts of Eucalyptus gum, in fine powder, and starch, for hæmorrhage and relaxed conditions of the larynx and trachea.
5. **Tinct. Eucalypt. Gummi.**—1 in 4. *Dose.*—20 to 40 ms. Added to 7 parts of water, forms an astringent gargle.
6. **Trochisci Eucalypt. Comp.**—Pot. Chlorus 2, cubeb powder ½, Eucalyptus gum 1, with fruit paste as a basis, for relaxed throat.

Pharmacology and Therapeutics.

Internally.—On account of the tannic acid it contains, eucalyptus gum is a true **astringent** like kino or catechu, but it is more powerful as it adheres with pertinacity to the mucous membrane. Its decoction, tincture or liquid extract (1 in 7) may be used as a gargle for the cure of **spongy gums** and **relaxed sore-throat**, or as a collunarium in **epistaxis**. The liquid extract mixed with water (1 in 10) makes a valuable lotion for injection into the vagina or rectum in **leucorrhœa** and **prolapse** of the **rectum**. The suppository (5 grs. in each) may be used in **piles**.

EUCALYPTI OLEUM.

Oil of Eucalyptus.

Source.—The oil distilled from the fresh leaves of *Eucalyptus globulus* and other species of *Eucalyptus*.

Characters.—Colourless or pale-yellow. Odour aromatic, camphoraceous. Taste pungent, leaving a sensation of coldness in the mouth. Sp. gr. 0·910 to 0·930. *Solubility.*—3 in 1 of alcohol (90 p.c.).

Composition.—(1) *Eucalyptol*, a volatile oil 70 p.c., being a mixture of (*a*) a *Terpene* called *Phellandrene*, (*b*) *Cymene*. (2) A *Resin* (crystallisable) yielding ozone. (3) An *Oil*, *Cineol*, isomeric with cajuputene hydrate. (4) *Tannin*.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Incompatibles.—Alkalis, mineral acids, metallic salts.
Action.—Powerfully antiseptic, deodorizer, antipyretic.
B.P. Dose.—½ to 3 ms.

Official Preparation.

1. **Unguentum Eucalypti.**—1 in 10.

Non-Official Preparations.

1. **Eucalyptus Dressings.**—Gauze 6 p. c. Wool and Lint 10 p.c.

2. **Eucalypteol.** *Syn.*—*Eucalyptene hydrochloride.*—Crystalline, white, bitter, insoluble in water. In phthisis and diarrhœa.
Dose.—2 to 6 grs.

3. **Eucalyptol.** *Syn.*—*Cineol.*—Is that portion of the oil which passes over between 347° and 351°. It does not dry up like a varnished coating. Useful in phthisis, asthma, diarrhœa. *Dose.*—1 to 4 ms.

4. **Tr. Eucalypti. B.P.C.**—Leaves of *E. Globulus* 4 ozs., Alcohol (90 p.c.) *q.s.* Percolate to 1 pint. *Dose.*—15 to 120 ms.

5. **Eucalypti Folia.**—The powdered leaves, in doses of 5 grs. and upwards, are much used in Italy for **malarial fevers**; also for smoking in cigarettes for the relief of **cardiac asthma.**

6. **Vapor Eucalypti.**—Oil 20 ms., Magnes. Carb. Levis 10 grs., water 1 oz. A tea-spoonful in a pint of hot water.

7. **Sanosin.**—A proprietary preparation. in the form of a black powder, containing charcoal, sulphur and eucalyptus oil. As an inhalation in **phthisis.**

Pharmacology.

Externally.—Oil of eucalyptus is a **powerful antiseptic and disinfectant.** The old oil is more antiseptic than the new because it is more ozonised. Rubbed into the skin it is less irritant than other volatile oils, but if evaporation be prevented it causes **rubefaction** and **vesication.** It is destructive to the lower forms of life.

Internally. **Gastro-intestinal canal.**—In small doses it increases the **salivary** and **gastric secretions,** and thus acts as a **stomachic.** In large doses it produces gastro-intestinal irritation, with symptoms of vomiting, diarrhœa and colic.

Circulation.—Like quinine, it stops the amæboid movements and **diapedesis of the white blood corpuscles** and contracts the **engorged spleen.** It possesses also **mild antiperiodic** and **antipyretic** properties. In small doses it stimulates the heart and raises the blood-pressure, perhaps reflexly through the stomach; and in excessively large doses the heart becomes weak and the blood-pressure and temperature fall.

Respiration is slightly stimulated by small doses, and is slowed by large ones. Death occurs from respiratory paralysis.

Nervous system.—Large doses depress the action of the brain, the medulla and the cord, thereby paralysing the reflex action.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Elimination.—Like most of the volatile oils, it is eliminated by the kidneys, the skin, and the respiratory and the genito-urinary mucous membranes, all of which it stimulates in the course of its passage. Hence it is a **diuretic**, a **diaphoretic**, a stimulating **expectorant**, and a disinfecting stimulant to the genito-urinary tract. Like oil of turpentine it causes renal congestion, and imparts to the urine an odour like that of violets.

THERAPEUTICS.

Externally.—Oil of eucalyptus, though a valuable antiseptic cannot be freely used on account of its local irritant property and cost. However, the ointment may be used for **foul ulcers** and **wounds**. The gauze, lint and wool are often used as antiseptic surgical dressings. Made into a pessary (15 ms. of oil in 1 dr. of cocoa butter and 1 dr. of white wax), it has been found serviceable in **cancer** of the **uterus** and **rectum** and in checking fœtor and decomposition of the lochia ; and into a bougie with iodoform (see iodoform), in **urethral chancre** and **gonorrhœa**. An ointment of oil of eucalyptus 8, iodoform 1, hard paraffin 27, and soft paraffin 6, is considered a valuable remedy in **chancres**. Alone or mixed with mustard oil or olive oil, it may be rubbed into the skin in **chronic rheumatism** and **myalgia**. The vapor has been used as an inhalation in **pulmonary gangrene**, **phthisis**, **chronic** or **foul bronchitis**, **ozæna**, &c. Many physicians now treat patients suffering from **exanthemata**, **whooping cough** and **diphtheria** by enveloping them in an atmosphere of eucalyptus vapor. In **influenza** this plan of treatment is popularly adopted. The inunction is also recommended in **scarlet fever**. It may be used as a **parasiticide**.

Internally.—To correct **fœtor of the expectoration**, or to cut short an attack of **coryza**, of **influenza**, or of **catarrh**, it may be used with benefit. In septic fevers, such as **pyæmia**, **septicæmia**, and **puerperal fever**, it has been found very efficacious in 5 ms. doses. It may arrest **ague** and reduce **enlarged spleen**, but it is far inferior to quinine. As a stomachic carminative it has occasionally been prescribed in **dyspepsia**, especially if the stools are foul-smelling. A rectal injection of eucalyptol is considered to be an effective remedy in **thread-worm**. Oil of eucalyptus is a popular prophylactic against **influenza**.

Prescribing hints.—The oil is best given on sugar or mixed with honey, and the emulsion may be used as a urethral injection. Mixed with good English honey, it is sold in the Calcutta market under the name of "Eucalyptus Honey" as a remedy for colds and coughs of children.

EUONYMI CORTEX.

Euonymus Bark. N. O. *Celastrineæ*.

Syn.—Wahoo, Spindle-tree and Hominy bush bark.
Habitat.—United States.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—The dried root-bark of *Euonymus atropurpureus.*

Characters.—In quilled or curved pieces; $\frac{1}{32}$ to $\frac{1}{6}$ in. thick; outer layer ash-grey marked with darker patches; inner surface pale tawny white, smooth when free from fragments of the white wood. Odour faint, characteristic. Taste mucilaginous at first, then bitter, acrid.

Composition.—(1) *Euonymin*, a resin. (2) *Asparagin.* (3) *Euonic acid.*

Official Preparation.

1. **Extractum Euonymi Siccum.** *Syn.*—*Euonymin.*

B.P. Dose.—1 to 2 grs. in pill. (Should be kept in well-stoppered bottle).

Non-Official Preparations.

1. **Tr. Euonymi B.P.C.**—Bark 4, Alcohol (90 p.c.), q.s. to 20. Percolate. *Dose.*—10 to 40 ms.

2. **Extract. Euonymi Liquidum**—Bark 1, Alcohol (90 p.c.) 4, water 1. *Dose.*—10 to 60 ms.

Pharmacology and Therapeutics.

The action of euonymin resembles in many respects that of podophyllin, but is milder. In very small doses it stimulates the secretion of the gastric juice, and in large doses it irritates the intestine. In medicinal doses it **increases the amount of bile and solids** secreted into the bowels. Hence it is a **cholagogue laxative.** It is said to have slight expectorant and diuretic properties. It is a very useful remedy in **hepatic disorders,** and in **constipation,** especially when it is due to torpidity of the liver. Combined with cascara, it may be given with very good results in **chronic or habitual constipation.**

Prescribing hints.—Euonymin may be given in pill or powder. The former is best massed with soap ($\frac{1}{6}$ gr. for a 2 or 3 gr. pill) if given alone. It is often prescribed with other cholagogues and laxatives as in the following formula—Euonymin $1\frac{1}{2}$ grs., Podophyllin $\frac{1}{4}$gr., Pulv. Ipecac. $\frac{1}{4}$gr., Pil. Colocynth et Hyos. $2\frac{1}{2}$ grs., Ext. Nucis Vom. $\frac{1}{6}$ gr. M.Ft. Pil. Mitte talis. 24. One pill at bed time in obstinate constipation. The following powder is often prescribed by the writer with encouraging results in infantile hepatic enlargement with slow fever.—Ext Euonymin Sic $\frac{1}{3}$ gr., Pulv. Ipecac. $\frac{1}{6}$ gr., Pulv. Rhei 2 grs. Salicinum 1 gr.. Sod. Bicarb. 2 grs. M. Ft. Pulv. Mitte talis 24, twice or thrice daily.

FEL BOVINUM PURIFICATUM.

Purified Ox Bile. N. O. *Ruminantia.*

Source.—Obtained by evaporating fresh ox bile to one quarter of its volume, shaking it with alcohol (90 p.c.) filtering and evaporating the residue to the consistence of a thick extract.

Characters.—Yellowish-green, hygroscopic. Taste partly sweet partly bitter. *Solubility.*—In water, alcohol (90 p.c.).

Action.—Antiseptic, purgative. **B.P. Dose.**—5 to 15 grs. in pill.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

Internally.—Ox bile helps the emulsification of fats, and is a **cholagogue purgative.** It may therefore be used in those cases of **dyspepsia** and **constipation,** in which the natural secretion of bile is very deficient. 20 to 30 grs. dissolved in 1 or 2 ozs. of water may be given as a clyster in cases of **impaction of fæces in the rectum,** where there is no room for a larger enema. It is generally given in cachets or in solution, but it is best administered in the form of keratin-coated or salol-varnished pills, two hours after food.

FERRUM. Iron. Fe.

Syn. I.V.—*Lohá.* Beng. Hind. *Louha,* Sans.

Source.—Annealed iron wire having a diameter of about 0·005 inch, or wrought iron nails free from oxide.

Iron salts naturally group themselves into 2 classes,—Ferrous or Protosalts based upon ferrous oxide FeO, Ferric or Persalts, (sesquisalts) upon ferric oxide Fe_2O_3. Ferrous salts soon become ferric from the absorption of atmospheric oxygen, especially in the presence of oxidising agents, as chlorine, nitric acid, &c.

Official Preparation.

1. **Vinum Ferri.**—1 oz. to 1 pint. Contains tartrates, citrates and malates of iron. 3 fl. drs. are equal to 5 ms. of Tr. Ferri Perchlorid. A mild hæmatinic tonic, may be given with cod-liver oil to children. **B.P. Dose.**—1 to 4 drs.

Non-Official Preparation.

1. **Mistura Ferri Aromatica. B.P. 1885.** *Syn.—Heberden's Ink.*—Red Cinchona Bark 1 oz., Calumba ½ oz.. Cloves ¼ oz., Iron wire ½ oz., Tr. Card. Co. 3 oz , Tr. Aurantii ½ oz., and Aqua Menth Pip. 16 ozs. Macerate. An example of authorised chemical incompatibility. A stomachic tonic and hæmatinic. *Dose.*—1 to 2 ozs.

FERRUM REDACTUM.

Reduced Iron. Fe and Fe_3O_4.

Source.—A fine powder containing 75 p.c. of metallic iron, with a variable amount of iron oxide ; prepared by reducing ferric hydroxide, heated to redness, by a stream of dry hydrogen.

Characters.—A greyish-black powder, attracted by the magnet.

Impurity.—Sulphur.

Action.—A non-astringent, hæmatinic, tonic.

B.P. Dose.—1 to 5 grs. in pill, powder or lozenge.

Official Preparation.

1. **Trochiscus Ferri Redacti.**—1 gr. in each. *Dose.*—1 to 6.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

FERRUM TARTARATUM.

Tartarated Iron.

Source.—Prepared like Ferri et Ammon. Citras with Acid Pot. Tartrate instead of citric acid.

Characters.—In thin, transparent, garnet coloured scales. Taste somewhat sweetish, astringent. *Solubility.*—1 in 1 of water. *Impurities.*—Ferrous salts, ammonia.

Identification.—Its scales are smaller than those of Ferri et Ammon. Citras, being lighter in colour and not so sweet.

Action.—Hæmatinic, tonic, diuretic.

B.P. Dose.—5 to 10 grs. in mixture.

FERRI ARSENAS. Iron Arsenate.

It consists of ferrous and ferric arsenates with some iron oxide.

Source.—Prepared by mixing hot solutions of sodium arsenate and ferrous sulphate, adding sodium bicarbonate in solution, and washing and drying the precipitate. $3FeSO_4 + 2Na_2HAsO_4 + 2NaHCO_3 = Fe_3(AsO_4)_2 + 2Na_2SO_4 + 4H_2O + 2CO_2$.

Characters.—A tasteless (not to be tasted), greenish, amorphous powder; insoluble in water. *Impurities.*—Sulphates, &c.

Antidotes.—The same as those of Acidum Arseniosum (see p. 175.)

Action.—Like arsenic. Useful in skin and liver diseases with gouty, rheumatic or malarial taint, also in chronic malarial fevers.

B.P. Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ gr. in pill.

FERRI CARBONAS SACCHARATUS.

Saccharated Iron Carbonate.

A ferrous oxycarbonate, $xFeCO_3\ yFe(OH)_2$, more or less oxidised, mixed with sugar; the ferrous salt if reckoned as carbonate, $FeCO_3$, forming about $\frac{1}{3}$ of the mixture.

Source.—Prepared by precipitating fresh iron carbonate by mixing solutions of ammonium carbonate and ferrous sulphate; and washing and rubbing it with sugar. Sugar prevents further oxidation.

Characters.—A greyish-brown, lumpy powder with a sweet chalybeate taste. *Impurities.*—Sulphates, excess of iron oxide.

Identification.—The greyish-brown colour, the lumpy nature; the sweet chalybeate taste and the absence of odour help recognition.

Incompatibles.—Vegetable astringents, acids and acid salts.

Action.—An easily borne non-astringent-chalybeate.

B.P. Dose.—10 to 30 grs. in cachets, powders, lozenges or pills.

Official Preparations.

1. **Mistura Ferri Composita.** *Syn.*—*Griffith's Mixture* (modified).—2½ grs. in 1 oz. A valuable preparation for amenorrhœa from anæmia. **B.P. Dose.**—½ to 1 oz.

Dispensing Hints.—The mixture may be prepared and kept without iron sulphate which (2½ grs. per ounce) may be added when dispensed.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

NON-OFFICIAL PREPARATIONS.

1. **Pilula Ferri Carbonatis.** *Syn.—Vallet's Mass.*—A freshly precipitated iron carbonate made into a pill with honey and sugar.

2. **Troch. Ferri Carb. Sacch.**—3 grs. in each. Largely used nowadays. *Dose.*—1 to 3.

FERRI ET AMMONII CITRAS.

Iron and Ammonium Citrate.

Source.—Prepared by mixing dilute solutions of ammonia and ferric sulphate, dissolving the resulting ferric hydroxide in hot solution of citric acid, neutralizing the product with ammonia, evaporating and drying in thin layers on glass sheets.

Characters.—In deep red, transparent, thin scales. Taste slightly astringent. *Solubility.*—2 in 1 of water. *Impurities.*—Tartrates, sulphates.

Identification.—It resembles Ferrum Tartaratum, but is darker, less shining, sweeter and is found in larger scales.

Incompatibles.—Mineral acids, fixed alkalis and vegetable astringents.

Action.—An almost non-astringent chalybeate, easily borne by the stomach when given in an effervescing form; the iron salt being put in the acid solution. **B.P. Dose.**—5 to 10 grs.

OFFICIAL PREPARATION.

1. **Vinum Ferri Citratis.**—8 grs. in 1 oz.
B.P. Dose.—1 to 4 drs.

FERRI ET QUININÆ CITRAS.

Iron and Quinine Citrate.

Source.—Prepared like Ferri et Ammon. Citras, freshly precipitated quinine being also dissolved in the solution of citric acid.

Characters.—In greenish golden-yellow somewhat deliquescent thin scales. Taste bitter. *Solubility.*—2 in 1 of water. *Impurities.*—Alkaline salts and other alkaloids instead of quinine.

Identification.—The golden-yellow colour, the bitter taste and the deliquescent nature distinguish it from other scale preparations. Note the characteristics of the three scale compounds.

Incompatibles.—Alkalis and their carbonates, tannin, vegetable astringents, potassium citrate.

Action.—Hæmatinic, tonic, antiperiodic. **B.P. Dose.**—5 to 10 grs. in pill or mixture.

FERRI PHOSPHAS. Iron Phosphate.

A powder containing not less than 47 per cent of hydrous ferrous phosphate $Fe_3(PO_4)_2\,8H_2O$, with ferric phosphate and some iron oxide.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—Prepared like Ferri Arsenas by substituting sodium phosphate for sodium arsenate (see p. 396).

Characters.—A slate blue amorphous powder, insoluble in water. *Impurity.*—A nervine tonic. **B.P. Dose.**—5 to 10 grs. in cachets, pills or powders.

Official Preparations.

1. **Syrupus Ferri Phosphatis.**—1 gr. of anhydrous ferrous phosphate in 1 dr. **B.P. Dose.**—½ to 1 dr.

Dispensing hints.—This may be conveniently made by mixing Liq. Ferri Phosph. Fort 1, Simple Syrup 5½, distilled water 1½. A small excess of the solution is necessary to prevent the loss from oxidation. The syrup is to be kept in small bottles lying down.

2. **Syrupus Ferri Phosphatis cum Quinina et Strychnina.** *Syn.—Easton's Syrup* (modified).—1 gr. anhydrous ferrous phosphate, ½ gr. Quinine sulphate, $\frac{1}{12}$gr. Strychnine, in 1 fl. dr. An excellent general and nervine tonic. **B.P. Dose.**—½ to 1 dr. (It becomes discoloured).

Dispensing hints.—This syrup may be made on the counter thus :—Strychnine 10 grs., Quinine sulphate 260 grs., Concentrated Phosphoric Acid 2 drs., Distilled water *q.s.* to 5 ozs. Mix and keep ready. When required 1 part to 7 parts of Syrup Ferri Phosphatis.

Non-Official Preparations.

1. **Liquor Ferri Phosphatis Fortis.**—8 grs. in 1 dr. Iron wire 360 grs., concentrated Phosphoric acid 6 ozs. Distilled water *q. s.* to 12 ozs. Dissolve.

2. **Pilula Ferri Quininæ et Strychninæ Phosphatum.** *Syn.—Easton's Pill.*—An equivalent for **Easton's Syrup.** Ferrous Phosphate 16 grs., Quinine Sulphate 16 grs., Strychnine ½ gr., Milk Sugar 20 grs., Concentrated Phosphoric Acid *q.s.* 83. Mix quickly, first having triturated strychnine with milk sugar and divide into 16 pills.

3. **Syrupus Ferri et Manganesii Phosphatum.**—Prepared by dissolving manganese phosphate ½ gr. in 1 dr. of official Syrup. Ferri Phosphatis.

4. **Syrupus Ferri Phosphatis Compositus. B. P. C.** *Syn.—Chemical Food, Parrish's Syrup* (modified).—Iron Phosphate ½ gr., Calcium Phosphate ½ gr. in 1 dr. Iron wire free from oxide 37½ grs., Concentrated Phosphoric Acid (Sp. gr. 1.5) 1 oz., Distilled water 5 drs., put all in a flask plugged with cotton and dissolve by gentle heat, iron being under the liquid. Add this to the following when the latter has cooled :—

Precipitated Calcium Carbonate 120 grs., Concentrated Phosphoric Acid 4 drs., Distilled water 2 ozs. ; mix and add Potassium Bicarbonate 9 grs., Sodium Phosphate 9 grs., filter and set aside.

Cochineal 30 grs., Distilled water 7½ ozs., boil for 15 minutes and filter, pouring over the filter water *q.s.* to make 7 fl. ozs. of filtrate ; to this add refined sugar 14 ozs. and heat till dissolved and strain. When cold add the former filtrate set aside, and distilled water *q.s.* to 20 ozs. It should be kept in bottles quite full. *Dose.*—½ to 2 drs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

FERRI SULPHAS.

Ferrous Sulphate $FeSO_4, 7H_2O$.

Syn. I.V.—*Hirekas.* Beng. *Hira Kasus.* Hind.

Source.—Prepared by the interaction of diluted sulphuric acid and iron.

Characters.—In oblique, rhombic prisms, of a pale greenish-blue colour and astringent taste. *Solubility.*—1 in 1½ of water. *Impurities.*—Persalts and other metals.

Identification.—Easy, as no other salt of B. P. resembles it. When exposed it effloresces becoming coated with a reddish brown crust.

Action.—Astringent, hæmatinic tonic and emmenagogue. An adjunct to purgatives. Externally astringent and styptic. Its lotion (10 grs. to 1 oz.) is very useful in erysipelas. **B.P. Dose.**—1 to 5 grs. in pill (see p. 88).

Official Preparations.

1. **Ferri Sulphas Exsiccatus.**—2½ grs. equal to 4 grs. Ferri Sulphas. A nearly white powder made by heating Ferri Sulph. at 212° till it loses 40 p.c. of its weight; and powdering it fine. *Enters into.*—Pil. Aloes et Ferri. **B.P. Dose.**—½ to 3 grs., in pill (see p. 88).

2. **Liquor Ferri Persulphatis.**—36½ p.c. Prepared by dissolving 8 ozs. of ferrous sulphate in 6 drs. of sulphuric acid diluted with 10 ozs. of water, and adding the same to nitric acid diluted with 2 drs. of water, and making up 11 oz., after converting the sulphate into persulphate by boiling. **Action.**—Styptic. *Enters into.*—The preparation of Ferri et Ammonii Citras, Ferri et Quinin. Citras, Ferrum Tartaratum and Liq. Ferri Acetatis.

3. **Pilula Ferri.** *Syn.*—*Blaud's Pill.*—1 Ferrous carbonate in 5, Ferri sulph. changes into carbonate. Both ferrous sulphate and sodium carbonate should be perfectly dry. An excellent hæmatinic tonic and emmenagogue, generally used in amenorrhœa. **B.P. Dose.**—5 to 15 grs.

4. **Pilula Aloes et Ferri.**—1 in 9. **B P. Dose.**—4 to 8 grs.

Non-Official Preparation.

1. **Liquor Ferri Sub-sulphatis. U.S.** *Syn.*—*Monsel's Solution.*—Strong styptic and least irritating. *Dose.*—3 to 6 ms.

LIQUOR FERRI ACETATIS.

Solution of Ferric Acetate.

Source and Characters.—A sour, red liquid prepared by dissolving ferric hydrate formed by precipitating solution of ferric sulphate with ammonia, in glacial acetic acid and water.

Action.—Hæmatinic, astringent, diuretic. Can be given with Potassium acetate in Bright's disease. **B.P. Dose.**—5 to 15 ms. in mixture.

Non-Official Preparation.

1. **Mist. Ferri et Ammon. Acetatis.** *Syn.*—*Basham's mixture.*—Tr. Ferri Perchloride. 2 drs., Acid Acetic dil. 3 drs., Liq. Ammon. Acetatis 2½ ozs., Elix. Aurantii 10 drs., Syrup 15 drs. Water 6 ozs. 2 drs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Mix the solution of acetate of ammonia with acid, add tincture, then the rest, and mix. *Dose.*—1 to 4 drs.

LIQUOR FERRI PERCHLORIDI FORTIS.

Strong solution of Ferric Chloride.

Source.—Prepared by boiling iron wire in hydrochloric acid and water, and after filtering, adding nitric acid and more hydrochloric acid, and evaporating.

Characters.—An orange-brown solution, miscible with water and alcohol. *Impurities.*—Ferrous Salts and other metals. 110 ms. contain 22½ grs. of iron.

Action.—Caustic, hæmostatic, powerful astringent.

Official Preparations.

1. **Liquor Ferri Perchloridi.**—1 in 4. **B.P. Dose.**—5 to 15 ms. diluted freely.

2. **Tinctura Ferri Perchloridi.** *Syn.*—*Steel Drops.*—1 in 4. **B. P. Dose.**—5 to 15 ms. diluted freely.

Non-Official Preparations.

1. **Liquor Ferri Chloroxydi.**—A non-irritant and non-astringent hæmatinic. *Dose.*—10 to 30 ms.

2. **Liquor Ferri Dialysatus B.P. 1885.**—Contains 5 p.c. of ferric oxide. A useful antidote to arsenic. A non-irritating tasteless hæmatinic, largely prescribed. *Dose.*—10 to 30 ms. It is in reality a colloid or undialysed iron, which does not pass through the septum; hence doubts are entertained as to its assimilation. But it is certain that patients improve under its use.

LIQUOR FERRI PERNITRATIS.

Solution of Ferric Nitrate.

Source and Characters.—An acid reddish-brown liquid, prepared by dissolving iron wire in nitric acid and water. 110 ms. contain 3½ grs. of iron. *Impurities.*—Ferrous salts, chlorides and sulphates.

B.P. Dose.—5 to 15 ms.

SYRUPUS FERRI IODIDI.

Syrup of Ferrous iodide. 1 gr. in 11 ms.

This is liable to discolouration either from the oxidation of iron, which may be removed by careful manipulation or by hypophosphorous acid; or from slight caramelisation of sugar by over heating. Very useful in syphilis and scrofula. **B.P. Dose.**—½ to 1 dr., 2 ms. for a child one year old.

Non-Official Preparations of Iodide of Iron.

1. **Liq. Ferri Iodidi.**—Prepared by combining iron wire 1 oz., iodine 2 ozs., in water 2 ozs., by gentle heat until all the iodine is combined. Decant and add concentrated hypophosphorous acid 1 dr., filter and add water to 4 ozs. 1 vol. to 7 vol. of thick syrup makes

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Syrupus Ferri Iodidi B.P. It keeps well in a corked bottle with a small quantity of hypophosphorous acid, or a coil of bright iron wire immersed in it.

2. **Pilula Ferri Iodidi. B.P. 1885.** *Dose.*—3 to 8 grs.

Additional Non-Official Preparations and Derivatives of Iron.

1. **Ferri Albuminas.**—A scale preparation fairly soluble in water, containing 5 p.c. of ferric oxide. Useful in anæmia and gastric ulcer. Striking results from the hypodermic injection of 10 to 20 ms. of aqueous solution. *Dose.*—3 to 10 grs.

2. **Ferratin.**—A tasteless brown powder prepared from egg albumen and Ferri et Sod. Tartras, containing iron 7 p.c. The most easily assimilable preparation known. *Dose.*—20 to 30 grs. per diem.

3. **Triferrin.**—A brownish yellow powder, insoluble in water, contains 21 p.c. of Iron and about 3 p.c. of Phosphorous.
Dose.—15 grs. per diem; in divided doses.

4. **Ferri Lactas.**—A greenish soluble powder. *Dose.*—2 to 10 grs.

5. **Carniferrin.**—A compound of phospho-carnic acid of muscle and iron. A tasteless brown powder easily assimilated. *Dose.*—8 grs. daily.

6. **Ferro Somatose.**—A tasteless soluble brown powder containing albumose of meat (somatose) and ferric oxide 4·5 p.c. Easily assimilable in anæmia and chlorosis. *Dose.*—75 to 150 grs. daily. **Iron tropon** is a similar compound with nutrient tropon. *Dose.*—1 dr. thrice daily.

7. **Ferri Succinas.**—Prepared by mixing ferri peroxid. hydrate 5, acid succinic 3, pot. citras 15, glycerin 15, water 120. Useful in biliary calculi, with chloroform. *Dose.*—1 dr. with chloroform 10 ms.; 4 to 6 times daily after food.

8. **Ferri Bromidum.** *Dose.*—3 to 10 grs.

9. **Syrupus Ferri Bromidi. B.P.C.**—4½ grs. ferrous bromide in 1 dr. Prepared by agitating ironwire free from oxide ½ oz., with bromine 533 grs., and water 4 ozs., and filtering the solution into warm syrup made by mixing sugar 14 ozs., and water 6 ozs. *Dose.*—½ to 1 dr.

10. **Syrupus Ferri Bromidi cum Quinina B.P.C.**—1 gr. of quin. acid hydrobrom. and 4 grs. of ferrous brom. in 1 dr. Prepared by dissolving quinin. acid hydrobrom. 160 grs. in water 13 drs., acid hydrobrom. dil. 3 drs., and adding syr. ferri bromidi to 20 ozs. *Dose.*—½ to 1 dr.

11. **Syr. Ferri Brom. c. Quin. et Strych. B.P.C.**—$\frac{1}{16}$ gr. of strychnine, 1 gr. of quinine acid hydrobrom. 4 grs. of ferrous brom. in 1 dr. Prepared as above with the addition of strychnine 2½ grs.
Dose.—½ to 1 dr. diluted.

12. **Ferri Hypophosphis.**—Freshly made salt is greenish, crystalline soluble in water, commercial salt is insoluble. *Dose.*—1 to 5 grs. in pill.

13. **Liquor Ferri Hypophosphitis Fortis. B.P.C.**— 5 grs. of ferrous hypophos. in 1 dr. *Dose.*—10 to 30 ms.

14. **Liquor Hypophosphitum Compositus. B.P.C.** *Syn.*—*Liquor Ferri Hypophosphitis Comp.*—2 grs. each of sodium and calcium hypophosphite, 1 gr. of magnesium hypophosphite, and 1½ grs. ferric hypophosphite in 1 dr. *Dose.*—½ to 2 drs.

15. **Syrup. Ferri Hypophos. B.P.C.**—1 gr. ferric hypophos. in 1 dr. Liq. Ferri Hypophosphitis Fortis 4 ozs., syrup 16 ozs. Mix.
Dose.—½ to 2 drs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

16. **Syrup. Hypophosphitum Compositus B.P.C.**—$\frac{1}{100}$ gr. of strychnine and $\frac{1}{8}$ gr. of quinine hypophos. in 1 dr. Strychnine 1 gr., hypophosphorous acid 2 drs. Dissolve, and add it to the following solution.—Calcium hydophosphite 80 grs., manganese 40 grs., potassium 40 grs., quinine 20 grs., distilled water 8 ozs. Filter, then add successively strong solution of ferric hypophosphite 1 oz., sugar 14 ozs ; dissolve without heat, and add chloroform 20 ms., alcohol (90 p.c.) 40 ms. ; shake well and add lastly water *q.s.* to 1 pint. This is intended to be a substitute for **Fellow's Compound Syrup of the Hypophosphites.**
Dose.—$\frac{1}{2}$ to 2 drs.

17. **Liquor Ferri Peptonati** (*Dieterich*).—A solution of peptonated iron. *Dose.*—1 to 4 drs.

18. **Ferri Fluoridum.**—A purplish-white insoluble powder. In enlarged spleen, or other enlarged glands. *Dose.*—$\frac{1}{20}$ to $\frac{1}{2}$ gr.

Pharmacology of Iron and its Salts.

Externally.—Iron salts have no action on the unbroken skin, and are not absorbed by it. **Ferrous** and **organic salts** are **feebly astringent** or not at all, but **ferric salts** are **powerful astringents.** A solution of ferric salt when applied to a denuded surface, mucous membrane, sores or ulcers, **coagulates the albuminous secretion,** as well as the **albumen** of the tissues. It also coagulates **blood** and **plasma.** Thus, the circulation of the part is greatly reduced by the compression of the coagulated albumen from outside and not by the contraction of the muscular fibres of the walls of the blood-vessels. If there is any **hæmorrhage,** it is readily arrested by (1) the compression of the blood vessels from without, and (2) the plugging of the bleeding vessels by the clothing of the blood within them. Therefore it is a powerful **styptic.** The perchloride, the pernitrate and the persulphate of iron are all strong **local astringents.** The oxides of iron convert oxygen into ozone and are therefore **disinfectants.**

Internally. **Mouth.**—Iron **blackens the teeth** and the **tongue,** from the deposition of iron sulphide. The sulphur is derived from the food and tartar on the teeth. It has a styptic taste, and the ferric salts have a similar action here as on the raw skin.

Stomach.—All iron preparations, in whatever form they are taken by the mouth, are mostly **converted into ferric chloride** in the stomach, and not into an albuminate as has been generally supposed. Even an albuminate is decomposed into a chloride. If given in excess, or if the food or the gastric juice is deficient, all iron salts (except the ferric chloride) will abstract the hydrochloric acid from the gastric juice, and impair digestion. On the other hand, strong acid salts set free an excess of acid, after the formation of the ferric chloride which acts as an **irritant** to the mucous membrane. Even the preparations of perchloride do this as they contain a large amount of free acid. The astringent effect

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of iron salts depends no doubt upon the amount of ferric chloride formed in the stomach.

Intestines.—Here too the iron salts undergo decomposition. The ferric chloride coming in contact with the alkaline fluid becomes an oxide of iron, which remains dissolved in the intestinal fluid because of the presence of organic matters. The subchloride becomes the ferrous carbonate which is also soluble. Lower down they are again converted into sulphides and tannates by the sulphuretted hydrogen and tannic acid, this being derived from the vegetable food, and are passed out with the fæces, which are coloured black. Experience has shown that iron produces **constipation**, particularly if the astringent preparations are given; but it is not known whether this is due to its direct or remote action. It is also a clinical fact that it occasionally causes **diarrhœa**. Doubts are entertained as to whether the iron salts are absorbed by the intestines, but from the following it will be evident that they are.

Absorption.—There is a concensus of opinion that **organic compounds of iron** are absorbed by the gastro-intestinal canal, for the growing child derives all the iron necessary for its increasing growth and weight from its food. But opinions widely differ as to the absorption of inorganic compounds of iron. Indeed one school holds that inorganic preparations are not taken up by the gastro-intestinal tract. Buchheim's view is that inorganic compounds of iron are not absorbed but exert their beneficial effect in anæmia by a stimulating action on the gastro-intestinal mucous membrane, whereby appetite and digestion are improved, and the extra food taken supplies the necessary iron to reconstitute the blood.

Bunge's theory is somewhat similar. He holds that inorganic iron cannot be absorbed, and that only iron in organic combination, as found in food stuffs, can be utilised for the formation of hæmoglobin. He says that, in anæmia, digestion is greatly disturbed, and that alkaline sulphides are produced which combine with the organic iron in the food, producing Fe_2S, which is an inorganic salt and therefore incapable of absorption. He argues that when iron is given in this condition, it combines with, and neutralises, the alkaline sulphides, thus protecting the organic iron of the food stuffs and allowing it to be absorbed. The chief argument in support of these views is that when iron salts are given by the mouth they do not cause excretion of more iron in the urine or the bile. But it has been shown that the absence of iron from the urine and the bile is fully accounted for by its retention in the liver and subsequent excretion through the intestinal mucous membrane. Moreover it has been proved that mere stimulation of the intestinal mucous membrane by other tonics does not cure anæmia and Stockman has shown (*a*) that sulphide of iron, which cannot absorb alkaline sulphides, will cure chlorosis

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(*b*) that bismuth which can neutralise more sulphides than iron, is quite useless for this purpose. The views of Bunge and Buchheim may therefore be rejected and the modern view founded on histological evidence is that iron salts are **absorbed by the intestinal epithelium** and transferred to the white corpuscles of the blood, which convey them to the liver where they are deposited and gradually elaborated into more or less complex organic substances one of which is certainly Ferratin. These organic compounds then slowly pass into the general blood stream, and are utilised by the great blood-forming organs, viz., the spleen, the lymphatic glands and the red bone marrow.

Blood.—In health iron has very little effect upon either the quantity or the quality of the blood corpuscles, but in some forms of anæmia, both the number of corpuscles and their hæmoglobin value are markedly increased. In cases of this kind it is probable that iron acts in the following way—(1) The functional activity of the blood-forming organs, which is lowered or suppressed in anæmia, requires a stimulus or impulse. (2) Iron, when carried in the circulation to these organs, acts as a *chemical stimulus* and not being an entirely foreign constituent is less injurious in its action than other stimulants. Hence iron is a splendid **hæmatinic**. As the quantity of iron in the blood of an ordinary healthy female is about 38 grains, we could, if the absorption of iron was great, cure chlorosis in one day's treatment; but such is not the case. The absorption is too slow and the process by which it is elaborated is too complex.

Metabolism.—With the improvement of the red blood corpuscles in anæmia, there is necessarily an increased absorption of oxygen, and an increased oxidation of tissues. Hence, the functional activity of all the organs of the body is stimulated, leading to the general improvement and the tone of the body. Iron is therefore a most valuable **general tonic**. As the whole system shares in this benefit, the menstrual flow, if it had been stopped, is re-established, and many disordered functions are rectified.

Kidneys and bladder.—Iron salts are feebly excreted by the renal cells. One milligramme is eliminated daily and this seems to remain almost constant in all circumstances. The ferric salts slightly diminish the secretion of urine, while the other preparations have no effect, except the tartrate and the acetate, which slightly increase it. They may sometimes **irritate the bladder**, and may cause **nocturnal incontinence** of urine in children.

Elimination.—Opinions vary. Some say that iron is excreted in the urine, sweat, saliva, milk, bile and pancreatic juice, and by the intestinal mucous membrane; while others, in the urine and bile only. However, this is a fact that much is eliminated by the gastro-intestinal mucous membrane, as the amount

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

in the urine and the bile is almost constant. A small portion of it is stored up in the spleen, the marrow and the lymphatic glands, but the most goes to the liver, where it is used up in forming complex compounds (one of which is ferratin), as the precursors of hæmoglobin. The red marrow also has a share in the production of red blood-corpuscles.

THERAPEUTICS OF IRON AND ITS SALTS.

Externally.—Organic iron salts and ferrous salts except ferrous sulphate are not locally used. The strong solution of ferric chloride may be used as a caustic to destroy **polypus** of the nose, **warts**, &c. Its solution (1 in 4) or the Liq. Ferri Perchloridi may be used as a local hæmostatic in **leech-bites**, and in **bleeding** after the extraction of a tooth. It is the most efficient last resource when injected into the uterus in **post-partum hæmorrhages**. The lint or cotton wool soaked in the solution may be introduced into the cavity of the nose, rectum or uterus in hæmorrhage from these parts. The solution or the tincture of perchloride mixed with equal quantity of glycerin makes an excellent paint on **enlarged tonsils, diphtheria** and **sore-throat**. The same may be used as a gargle well diluted. A solution of ferrous sulphate (10 grs to 1 oz. of water) is an extremely useful local application in **erysipelas**, and **erythema**, but it deserves to be noted that its stain on the linen is not removed by washing. Sometimes the tincture of perchloride may be painted for the same purpose. A solution of sulphate (1 gr. in 1 oz.) has sometimes been found effective in **gleet**.

Internally. **Gastro-intestinal tract.**—As a rule the organic preparations are more easily assimilable than the inorganic. In severe hæmorrhage from the stomach or bowels, as from **ulcers**, innocent or malignant, or **cirrhosis of the liver**, the solution or tincture of perchloride is an excellent remedy for arresting it. It may be given in drachm doses every one or two hours with glycerin. The constipating effect of iron is overcome by the addition of a purgative. **Chronic diarrhœa**, rebellious to all manner of treatment, is sometimes wonderfully checked by the solution of pernitrate. **Chronic constipation** may often be successfully removed by ferrous sulphate and extract of nux vomica or extract of belladonna. Humid peroxide of iron is an antidote to **arsenical poisoning**. It can be prepared fresh by mixing a solution of perchloride 3 ozs., with bicarbonate of soda 1 oz, in solution, half an ounce being given every 5 or 10 minutes. Liq Ferri Dialysati may be given in its stead in ½ or 1 oz. doses diluted. An enema of the tincture of perchloride of iron (1 dr. in ½ pint of water) kills **threadworms**.

Blood.—As a hæmatinic tonic, iron salts stand on a high level, and are used in endless ailments, such as **anæmia, chlorosis, scrofula, cardiac diseases, syphilis, Bright's disease,**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

amenorrhœa, malarial cachexia, convalescence from acute or chronic illness, &c. A few of them require more than a passing notice.

Anæmia and *Chlorosis*.—Ordinary forms of anæmia traceable to some definite cause, such as scurvy, malaria, protracted discharges or recurrent passive hæmorrhage, lead-poisoning, ankylostomiasis, &c., are materially benefited by a course of iron, as well as by the removal of the cause, if possible. Iron is the most valuable medicine in chlorosis of young females. Pilula ferri, ferrous sulphate and ferric perchloride are the preparations generally selected. Striking results were obtained by Stockman in chlorosis by the subcutaneous injection of ammonio-citrate in small doses. If the anæmia is due to malaria, Ferri et Quinin. Citras, Easton's syrup or pill may be given with advantage. The same preparations may as well be employed as a tonic during convalescence after an acute febrile attack or any other protracted illness. Iron, particularly the perchloride, is very useful in recurrent passive hæmorrhage from the nose, uterus or respiratory tract, or in discharge from the same or allied parts, as leucorrhœa. The writer once stopped a persistent bleeding from the uterus, caused by a prolonged use of aloes as a purgative for obstinate constipation, when every other hæmostatic failed. Iron often removes that form of neuralgic pain or insomnia which sometimes accompany anæmia. Iron is quite useless in the treatment of pernicious anæmia and its value is doubted in the anæmia of *leucocythæmia*, *Hodgkin's disease* and *exophthalmic goitre*.

Bright's disease.—Acetate of iron is the most valuable remedy in this disease. It not only removes the anæmia, but lessens or removes the albumen. 10 to 20 ms. of the tincture with half an ounce of the solution of acetate of ammonia, or with potassium acetate, or with both, form an exceedingly useful preparation in chronic albuminuria. With many the steel drops is a favourite remedy.

Amenorrhœa due to anæmia often yields to iron especially when given with potassium carbonate or aloes, as for example, Blaud's pill, Pil. Aloes et Ferri and Mist. Ferri Comp. with equal part of decoction of aloes.

Syphilis, *scrofula* and *chronic rheumatoid arthritis* are benefited by a course of iodide of iron. The syrup is ordinarily prescribed in these cases.

Many obscure symptoms dependent on anæmia, such as dyspepsia, headache, vertigo are relieved by a course of iron. Lately the writer has given Tr. ferri perchloridi an extended trial in chronic diabetes, and is pleased to record that patients improved under its use. The bowels and the digestive functions had to be kept in order.

Erysipelas, diphtheria and many forms of bad sore-throat,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

such as **hospital sore-throat**, are remarkably benefited by large doses (15 to 30 ms.) of Tr. ferri perchloridi given every one or two hours. Many yet recommend steel drops in **puerperal fever**. But the tendency of the present day is to ignore the value of this tried drug.

Nervous system.—Iron cannot directly influence the nervous system, but indirectly it does by improving the nutrition and the general functions of the bodily organs. It has been found efficacious in **chorea, hysteria, neurasthenia**, and in many nervous and subjective symptoms commonly associated with the climacteric period. Easton's syrup or pill, Syr. Hypophosph. Comp., Syr. Ferri Hypophosph., or Syr. Ferri Brom. c. quin. may be selected with advantage.

Caution.—The following points should always be remembered during the administration of iron :—

1. Iron sometimes irritates the stomach even of healthy persons.
2. Never give iron to a patient with a "dirty" tongue. Cure the dyspepsia first, and then administer iron.
3. Begin with one of the milder preparations and give it after meals.
4. Use it very cautiously in plethoric subjects, or in those who are predisposed to apoplexy.
5. Change your preparation from time to time during a long course of iron treatment, or stop it at intervals.
6. If iron causes constipation, combine it with purgatives.
7. If iron causes headache or indigestion, stop it atonce.
8. Iron should never be given to a patient who is suffering from fever.

Prescribing hints.—The choice of a preparation sometimes becomes difficult to a young practitioner. He should distinguish an astringent from a non-astringent preparation, and bear in mind that there are a few, such as iodide, arsenate, phosphate, and citrate with quinine, whose value depends, mainly or to some extent upon the other ingredients they contain. The organic salts are non-astringent. Of the inorganic salts, the ferrous salts are less astringent than the ferric salts. These salts may be given in powder, pill, mixture or hypodermically. The perchloride is largely employed in various ways, as a gargle, pigment, spray, dressing (*e.g.*, cotton or lint soaked in solution 15 p.c.), rectal, uterine or urethral injection or mixture. If given in a mixture, glycerin or lemon juice pretty well covers the ferruginous taste. The infusion of quassia, calumba or chiretta may be used as a vehicle as they do not contain tannin. The constipating property of iron salts is best removed by Mag. Sulph. if given in a mixture, or by aloes or rhubarb if in pill. The inky colour which results if they are combined with cinchona or digitalis, is cleared by the addition of a few drops of diluted phosphoric acid. The action of iron is not affected by this chemical change. Blaud's pill and Griffith's mixture are exceedingly good preparations in anæmia, as they contain alkaline carbonates which tend also to form red blood-corpuscles. Syr. Ferri Phosph. and Syr. Ferri

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Iodidi should be given alone diluted. Ferrous sulphate is given in pill (see p. 88), and if it is intended for action on the intestine it should be coated with Keratin. To prevent the blackening of the teeth, the iron mixture should be swallowed through a glass tube or a quill. Ferri et Ammonii Citras may be given hypodermically (a 5% solution), or in mixture in an effervescing form; care being taken to put the iron into the acid solution. Parrish's chemical food is an excellent preparation for children and delicate females. Citrate of iron and quinine should not be mixed with alkalis or alkaline carbonates as the quinine is precipitated.

FICUS. Figs.

N. O. *Urticaceæ.*

Habitat.—Smyrna.

Source.—The dried fleshy receptacles of *Ficus carica.*

Characters.—Consists of the enlarged hollow succulent receptacle bearing numerous achenes on its inner surface.

Composition.—(1) *Sugar.* (2) *Mucilaginous substances.*

Action.—Laxative. **Enters into.**—Confectio Sennæ.

Pharmacology and Therapeutics.

Externally.—Figs cut open and warmed make a popular emollient soothing poultice.

Internally.—They are a pleasant nutritious food, and have a **mild laxative** action. The seeds produce griping by irritating the mucous membrane. Useful in mild **constipation.**

FILIX MAS.

Male Fern. N.O. *Filices.*

Habitat.—Britain. Found in the Hymalayas.

Source.—The rhizome of *Aspidium filix-mas.* Collected late in the autumn, divested of its roots, leaves, dead portions, and carefully preserved.

Characters.—3 to 6 in. long. Rhizome ¾ to 1 in. in diameter; entirely covered with curved, angular, dark-brown bases of the petioles which bear membranous scales; brown externally, green internally. Transverse section shews 8 pale yellow fibro-vascular bundles. Odour feeble, disagreeable. Taste first sweetish astringent, then bitter and nauseous.

Identification.—It bears no resemblance to any other drug. Its appearance is most peculiar.

Dispensing hints.—It should not be kept longer than a year.

Composition.—(1) *Filicic acid,* a white amorphous powder, the active principle. (2) *Aspidin,* 3 p.c. a poisonous substance. (3) A *Fixed oil.* (4) A *Volatile oil.* (5) *Resins.*

Action.—Tæniafuge. *Dose.*—60 to 180 grs. powdered.

Official Preparation.

1. **Ext. Filicis Liq.** *Syn.*—*Oil of Male Fern.*—A dark green syrupy substance with a disagreeable odour and nauseous taste.

B.P. Dose.—45 to 90 ms.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

Internally.—Male fern is a safe and reliable **anthelmintic** for tapeworm (*Tænia Solium* and *T. Bothriocephalus*), but being a local irritant it causes vomiting. It must be given in fairly large doses (1 to 2 drs.) to adults on an empty stomach at bed time, after the bowels have been cleared by a dose of castor oil, and must be followed by a brisk purgative next morning. It is said to expel *Ankylostoma duodenale.*

Prescribing hints—The liquid extract is best given in fresh milk or emulsified by fresh mucilage of acacia and flavoured by chloroform water. The patient should lie down after taking the draught, because it is liable to make him sick. The purgative must be a powerful one so as to weaken the head of the worm and loosen its hold upon the intestine. The head must be carefully looked for in the stools, and if it is not found, a second dose of the drug should be given two or three days later so as to expel it. But if more time is allowed the worm grows again and gets strong and the effect of the second dose may have no more effect than the first. The efficacy of the drug is enhanced by combining it with oil of turpentine. The drug may also be well emulsified by ovi vitellum.

FŒNICULI FRUCTUS.

Fennel Fruit. N.O. *Umbelliferæ.*

Syn. I.V.—*Bari Sanf*, *Saurif*, Hind.

Habitat.—The Central and Southern Europe, Japan, India.

Source.—The dried fruit of cultivated plants of *Fœniculum capillaceum.*

Characters.—$\frac{1}{4}$ to $\frac{2}{5}$ in. long, $\frac{1}{10}$ in diameter, oblong, curved, glabrous, greenish-brown or pale-yellowish brown, capped by a stylopod and two styles. Odour aromatic. Taste aromatic, sweet. The fruit is readily separated into 2 mericarps, each of which has 5 prominent primary ridges, and exhibits in transverse section 6 large vittæ.

Identification.—It resembles caraway, Anise and Conium fruits. Fennel is larger and its vittæ more prominent.

Composition.—(1) A *Volatile oil* (*non-official*). *Dose.*—5 to 15 ms.

Enters into.—Pulv. Glycyrrhizæ Comp. and the

Official Preparation.

1. **Aqua Fœniculi.**—1 in 20. distil 10. *Dose.*—1 to 2 ozs.

Pharmacology and Therapeutics.

The same as those of oil of anise or of dill. It is supposed to have the property of increasing the secretion of milk.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

GALBANUM. Galbanum.

N.O. *Umbelliferæ.*

Habitat.—Persia, the Levant.

Source.—A gum-resin obtained from *Ferula galbaniflua* and from other species.

Characters.—In tears or in irregular masses of agglutinated tears. Tears rounded or irregular, yellowish brown or orange-brown externally, yellowish-white internally. Rough, dirty, sometimes translucent. Hard and brittle in cold, soft and sticky with heat. Odour characteristic. Taste bitter, unpleasant. *Impurity.*—Slices of root which remain mixed.

Identification.—It resembles ammoniacum, asafetida, benzoin, distinguished by their respective odours.

Composition.—(1) A *Volatile oil* (2) *Sulphurous resins.* (3) *Umbelliferone.* (4) *Gum.*

Dispensing hints.—It should be heated to 212° F. and strained before use.

Action.—Antispasmodic, expectorant. **B.P. Dose.**—5 to 15 grs.

Official Preparation.

1. **Pilula Galbani Composita.** *Syn. B. P.—Compound Pill of Asafetida.*—1 in 3½. **B.P. Dose.**—4 to 8 grs.

Pharmacology and Therapeutics.

Its actions and uses are the same as those of asafetida (see p. 255), but less energetic. Sometimes its plaster is applied to **chronic inflammatory swellings.** As it is scarcely ever prescribed now, it might with advantage be removed from the B.P.

GALLA. Galls.

N.O. *Cupuliferæ.*

Syn.—Nut-galls. **Syn. I.V.**—*Majufal*, Beng. *Maifal*, Hind.

Habitat.—Asia Minor. Imported from Persia, Greece and Turkey.

Source.—Excrescences on a species of oak *Quercus infectoria*, resulting from the puncture and deposition of an egg or eggs of *Cynips gallæ tinctoriæ.*

There are two kinds of galls. The *blue, black or non-perforated galls* collected before the escape of the mature insect are the best. The *white or perforated galls* collected after the escape of the insect are inferior in quality.

Characters.—Hard, heavy, sub-globular ½ to ¾ in. in diameter, tuberculated on surface, tubercles and intervening spaces smooth, dark bluish-green or dark olive-green externally, yellowish or brownish-white within, with a small central cavity. No odour. Taste intensely bitter.

Identification.—Easy.

Composition.—(1) *Tannic acid* (*off.*) 60 to 70 p.c. (2) *Gallic acid* (*off.*) 3 to 5 p.c.

Incompatibles.—The same as those of tannic acid (*q.v.*)

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

OFFICIAL PREPARATIONS.

1. **Unguentum Gallæ.**—1 in 5. Pale brown.
2. **Unguentum Gallæ c. Opio.**—7½ p.c. of opium. Brown. May be made directly by mixing opium 15 grs., galls 37 grs., and benzoated lard 148 grs.

ACIDUM GALLICUM.

Gallic Acid. $C_6H_2(OH)_3COOH,H_2O$.

Source.—A trihydroxy-benzoic acid, prepared by the action of diluted sulphuric acid on tannic acid.

Characters.—In whitish or slightly brownish acicular needles. No odour. Taste faintly acid. *Solubility.*—1 in 100 of cold; 1 in 3 of boiling water; 1 in 5 of alcohol (90 p.c.); 1 in 12 of glycerin.

Identification.—It is recognized by its pale fawn colour, the shape of its crystals and the absence of odour.

Incompatibles.—Spt. æther is nitrosi, persalts of iron, metallic salts and caffeine.

Action.—Said to be a remote astringent. **B.P. Dose.**—5 to 15 grs.

NON-OFFICIAL PREPARATION.

1. **Gallanol.** *Syn.—Gallic Acid Anilide.*—In colourless crystals sparingly soluble in water. Used as a substitute for chrysophanic acid.

ACIDUM TANNICUM.

Tannic Acid. $C_{14}H_{10}O_9.2H_2O$.

Syn. B.P.—Digallic acid. Tannin.

Source.—May be extracted by water-saturated ether from galls which have been subjected to a special fermentation.

Characters.—A light brownish powder consisting of thin glistening scales. Odour characteristic. Taste strongly astringent.

Identification.—The general appearance, the faint but characteristic odour and the colour help recognition. Sometimes it may be confounded with benzoic acid, but the characteristic odour of benzoin distinguishes it.

Incompatibles.—Gelatin gives a yellowish-white precipitate (not with gallic acid), alkalis, mineral acids, antimonial, lead and silver salts, ferric salts, and vegetable alkaloids.

OFFICIAL PREPARATIONS.

1. **Glycerinum Acidi Tannici.**—1 in 5, or 1 in 6¼ by weight.
2. **Suppositoria Acidi Tannici.**—3 grs. in each.
3. **Trochiscus Acidi Tannici.**—½ gr. in each. *Dose.*—1 to 6.

NON-OFFICIAL PREPARATIONS.

1. **Tannalbin.**—A compound of tannin and albumen. A pale brown tasteless insoluble powder. An intestinal disinfectant and astringent, soluble in the intestines. *Dose.*—8 to 15 grs.
2. **Honthin.**—A keratinised greyish-brown compound of tannin and albumen. Very useful in infantile diarrhœa. *Dose.*—10 to 30 grs.
3. **Tannigen.** *Syn.—Di-Acetyl-Tannin.*—A greyish-white powder

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

insoluble in water. Both tannalbin and tannigen appear in the urine as gallic acid. In enteritis and infantile diarrhœa. *Dose.*—3 to 8 grs.

4. **Tannoform.**—A compound of tannic acid with formic aldehyde, in greyish-yellow powder insoluble in water. An excellent anhydrotic, antiseptic and siccative. As a dusting powder in bromidrosis, bed-sores, soft chancres, eczema, &c. Internally in infantile diarrhœa.

Dose.—10 to 15 grs.

5. **Tannone.**—A condensation product of tannin and urotropine. A brownish odourless insoluble powder. Found valuable in tubercular and typhoid diarrhœa. *Dose.*—5 to 15 grs.

6. **Tanocol.**—A compound of tannin and gelatine. Intestinal astringent. *Dose.*—15 grs.

PHARMACOLOGY.

Externally.—Tannic acid or substances containing it coagulate albumen, gelatin and mucus, but gallic acid does not. Tannic acid has no action on the unbroken skin, but applied to an exposed mucous membrane or a denuded surface it coagulates the mucus and the albuminous secretions, and forms a firm insoluble protective covering over the part. The coagulated albumen or gelatin resists putrefaction. Absorbed into the tissues, it coagulates the interstitial fluids, and condenses the albuminous and connective tissues, and thereby diminishes the serous discharge. Hence it is a **powerful local astringent**. It arrests hæmorrhages partly by causing plugging of the small vessels and partly by the production of a coagulum in the surrounding tissues, but it does not diminish the calibre of the vessels themselves as it has no action on the muscular coats. It is therefore a **local hæmostatic**. Rosenstirn's experiments prove that the blood-vessels are slightly dilated, but the strong constringent effect produced by the coagulum more than counter balances this feeble dilatation. It slightly depresses the local sensory nerves, and has feeble **antiseptic** and **irritant** properties.

Internally. **Mouth.**—Tannic acid causes dryness of the mouth with a feeling of astringency and of stiffness of the tongue and throat, owing to the coagulation of the secretions of the mucous membranes. It slightly depresses the common sensory nerves and the special nerves of taste.

Stomach.—Its action on the stomach is the same as on the mouth. A portion of it is converted into an albuminate, which is very slow of absorption and is consequently more readily converted into gallic acid in the intestines. Large doses **impair digestion by precipitating** pepsin, and often cause **gastric irritation** and vomiting, but stop hæmorrhage by their **local hæmostatic** property.

Intestines.—Here also it acts as an astringent and hæmostatic so long it is not **converted into gallic acid** and alkaline tannates. Therefore, to obtain these effects, it should be given in sufficiently large doses. The conversion into gallic acid occurs

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

thus :—$C_{27}H_{22}O_{17}$ (tannic acid) + $4H_2O$ = $3H_3C_7H_3O_5$ (gallic acid) + $C_6H_{12}O_6$ (glucose). The undecomposed tannates and unabsorbed gallates are thrown off with the fæces. Tannic acid cannot affect the biliary secretion.

Blood.—Tannic acid enters the blood mostly as gallates and partly as tannates and circulates as such. Injected into a vein it causes death by thrombosis.

Remote action.—As the gallates and the alkaline tannates thus absorbed cannot coagulate albumen or produce any local astringent effect, it is impossible to accept the theory which many advocate that gallic acid acts as a remote astringent.

Elimination.—There is a great diversity of opinion as to its excretion. According to some, any that has been absorbed is decomposed in the human body, because no derivative of tannic acid can be detected in the human urine or other secretions; although gallates and traces of tannates are found in the urine of animals. But Stockman found gallic acid with **traces** of tannin in the urine when pure tannin was given by the mouth; and a **large** amount of tannin with a **little** gallic acid in the urine, when sodium tannate was administered.

THERAPEUTICS.

Externally—As a **local hæmostatic**, tannic acid is largely employed in **hæmorrhages** from the nose, the rectum, the bladder, the urethra, the uterus, wounds, ulcers, &c. It may be dusted over **wounds** or **ulcers**, or used as a snuff or a nasal douche in **epistaxis**, or as gall ointment or a suppository in **hæmorrhoids**, or as a pessary (10 grs. to 1 dr.) in **cancer of os**, or as a bougie in **gonorrrhœal hæmorrhage**. As a *local astringent*, it has been found useful in subduing mild forms of subacute or chronic inflammatory processes and discharge from the skin, as in **eczema**, **intertrigo** (Glyc. Acidi Tannici); the ear, as in **otorrhœa** (Glyc. Acid. Tannici); the eye, as in **conjunctivitis** and **corneal vascularity** (a collyrium 4 grs. to 1 oz.); the nose, as in **ozæna** (a douche, snuff or paint); the vagina, as in **leucorrhœa** (an injection, douche or pessary); the uterus, as in **cancer** or **ulcerated os** (pessary or cotton wool soaked in tannic acid and glycerin); the urethra, as in **gonorrhœa** and **gleet** (10 grs. to 1 oz. as an injection); the bladder, as in **cystitis** (injection); and the rectum, as in **ulcers fissures** and **prolapse of the rectum** (an injection and suppository). Dr. Ringer recommends tannic acid pomade (tannin 1 dr., glycerin ½ dr, balsam of Peru 20 drops, bitter almond oil 4 drops, lard 1 oz.) in **dandruff**.

Internally. **Alimentary canal.**—Tannic acid makes a very good dentifrice for **bleeding** and **ulcerated gums**. Glycerin of tannic acid is a valuable application in **ulcerative stomatitis**, **subacute**, **chronic** or **aphthous sore-throat**, **relaxed** or

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

elongated uvula, enlarged tonsils, &c. A gargle (Glyc. acidi tannici 1 dr. to 1 oz.), a spray (1 dr. in rose water 10 ozs.) or lozenges may be used in these cases. An insufflation of tannin with starch makes also an excellent application for the mouth and larynx. It is a valuable remedy for **gastric** and **intestinal hæmorrhage,** but it should be given in large doses, say 30 to 40 grs. every one or two hours. It is a valuable **antidote** in **poisoning** by **alkaloids** and **antimonial salts.** Tannic acid is largely employed in **diarrhœa** either acute or chronic. Tubercular, enteric or dysenteric diarrhœa often yield to its use. The writer has obtained good results in **cholera,** especially in the hæmorrhagic variety, by giving tannic acid 10 grs. and diluted sulphuric acid 10 ms., along with warm rectal injections of tannic acid (30 grs. to 1 qt. of hot water) during collapse.

Notwithstanding the absence of all proof of their action as remote hæmostatics or remote astringents, gallic acid and tannic acid still find favour with many old-fashioned physicians in the treatment of **internal hæmorrhages,** such as hæmoptysis and hæmaturia; and of **excessive secretions** from any part of the body, as phthisical night-sweats. As a remedy for **albuminuria** it is valueless.

Prescribing hints.—The different forms in which tannic acid may be used externally have already been noticed. Internally it may be given in solution (see p. 84), cachets, or pills (see p. 89). In the absence of tannic acid any vegetable infusions containing tannin, such as strong tea or decoction of oak-bark, may be employed in alkaloidal poisoning. It should not be combined with ferric salts. Caffeine is precipitated by tannic acid but is redissolved if the latter be in excess.

GAULTHERIÆ OLEUM.

Oil of Gaultheria.

(*Ind. and Col. Addendum.*)

Syn. B.P.—Oil of Wintergreen.

Habitat.—North American Colonies.

Source.—The oil distilled from the leaves of *Gaultheria procumbens* (N.O. *Ericaceæ*), or from the bark of the sweet birch, *Betula lenta* (N.O. *Betulaceæ*). It contains at least 90 p.c., generally more, of natural methyl salicylate.

Characters.—Colourless or sightly yellowish. Odour strong, characteristic. Taste warm, sweetish, aromatic. Sp. gr. 1.176 to 1.187.

B.P. Dose.—3 to 10 ms.

Non-Official Preparations and Derivatives.

1. **Methyl Salicylas. U.S.** (*Synthetic*).—A colourless liquid, having the odour and taste of oil of Gaultheria. Less irritating than the natural oil.

2. **Sanoform.** *Syn.—Di-iodo-methylsalicytate.*—A white crystalline

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

powder insoluble in water. Used externally as a non-irritant substitute for iodoform.

3. **Mesotan.**—*Methoxy-methylester of Salicylic Acid.* Is free from the penetrating odour of methyl Salicylas. An inunction of 1 part Mesotan with 2 parts of Olive Oil is very useful in rheumatism and gout, especially if combined with the internal administration of Aspirin. It should only be smeared on the part, which is then wrapped in a layer of absorbent cotton. If it is rubbed in very vigorously, it produces considerable irritation and a papular eruption.

4. **Ulmaren.**—A similar preparation. Makes an admirable ointment if combined with Menthol and Lanoline.

Pharmacology and Therapeutics.

The actions and uses of this oil are very much the same as those of the salycylates (see p. 195). It is largely employed in America, externally and internally in acute rheumatism. For mode of application, see Mesotan (above). A proprietory preparation known as "*Betul-ol*" is only Oleum Gaultheriæ.

GELATINUM. Gelatin.

Source.—The air-dried product of the action of boiling water on such animal tissues as skin, tendons, ligaments and bones.

Characters.—In translucent, almost colourless, sheets or shreds. A solution in 50 parts of hot water solidifies to a jelly on cooling. Insoluble in alcohol (90 p.c.) and ether. Tannin precipitates it.

Enters into.—The preparation of Suppositoria, Glycerini and Lamellæ.

USES.

Gelatin is used as a basis for several pharmaceutical preparations, such as suppositories, pessaries, bougies, discs, gelatin capsules, and as a coating for pills. Glycogelatin (gelatin 1, glycerin 2½, orange flower water 2½, ammoniated solution of carmine *q.s.* to colour) is an excellent basis for throat pastilles (see p 72). Each should weigh 30 grs. It is largely employed in dietary for making jellies, &c.

Medicinally it acts as a hæmostatic, due according to Zibell to an admixture of lime 0·6 p.c. in solution. A 5 p.c. to 10 p.c. solution may be locally used in wounds, **epistaxis**, &c., or as a sterilized concentrated saline solution hypodermically into the gluteal region in **internal hæmorrhages**.

GELSEMII RADIX.

Gelsemium Root. N.O. *Loganiaceæ.*

Habitat.—The south-eastern United States.

Source.—The dried rhizome and rootlets of *Gelsemium nitidum*, the yellow jasmine.

Characters.—Cylindrical, 6 in. long, ¼ to ¾ in. thick, brown or dark

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

brownish-violet, with fibrous roots occasionally attached. Roots tortuous, finely wrinkled. Odour aromatic. Taste bitter.

Composition.—(1) *Gelsemine*, a crystallisable alkaloid. (2) *Gelsemin*, a resinoid substance. (3) *Gelsemic acid*, inert but serves a test. (4) *Gelseminine*, a poisouons amorphous alkalold. (*Carefully note the spelling of these bodies.*)

Action.—Analgesic, antispasmodic. *Dose.*—5 to 30 grs. powdered.

Official Preparation.

1. **Tinctura Gelsemii.**—1 in 10. Pale-brown.

B.P. Dose.—5 to 15 ms.

Non-Official Preparations.

1. **Gelsemine.**—In yellowish-white sparingly soluble crystals. Its salts **Gelsemine hydrochloride**, white granular freely soluble in water, was formerly used to dilate the pupil. *Dose.*—$\frac{1}{60}$ to $\frac{1}{30}$ gr.

2. **Gelsemin.**—A pale brown extractive, used as a hypnotic and in neuralgia. *Dose.*—$\frac{1}{2}$ to 2 grs. *Must not be mistaken for the alkaloids.*

Pharmacology.

Externally.—Topically applied it is a **mydriatic.**

Internally. **Heart and Circulation.**—No action in small doses. In toxic doses it powerfully **depresses the heart** and causes a fall of blood-pressure, due to the paralysis of the vagal ends.

Respiration.—In large doses it is a **powerful respiratory sedative**, producing weakness of respiration and death from **asphyxia.** This is caused by the direct paralysis of the respiratory centres in the medulla and cord.

Nervous System. *Brain.*—No action on cerebral centres except drowsiness caused by asphyxia.

Spinal Cord.—It **depresses** first the functional activity of the **anterior cornua**, producing **paralysis** of all the **muscles** of the **body**; then the sensory tracts, with consequent **anæsthesia**, which is but slight. The motor nerve trunks are not affected, but their end-plates only are paralysed just before death. As a consequence of these actions, the gait of the patient becomes staggering and he is no longer able to walk straight, and his general sensibility is lessened. Convulsions precede death, due probably to the asphyxiated condition of the blood.

Eye.—It **paralyses the ocular muscles** causing **diplopia** and **ptosis**, owing to the paralysis of the motor cells (centres) in the floor of the fourth ventricle and the Sylvian aqueduct, which are a continuation of the anterior cornual cells. Opinions differ as to its action on the pupil. Some say that it is **dilated**, others that it is **contracted.**

Toxic action.—The symptoms are generally seen to appear in the following order:—Tolerably large doses produce browache, giddiness, ocular pain, dimness of sight. Large doses diplopia and contraction of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the pupil. Still larger doses ptosis, weakness of ocular and facial muscles, staggering gait, and sleepiness. Poisonous doses inability to articulate or walk, tremor of the head, quick-feeble pulse, impaired sensibility, general muscular paralysis, cold sweat, fall of temperature, slow and laboured respiration, occasional convulsions and death from asphyxia. 2 ozs. of tincture have caused death.

Antidotes.—Emetics or pump. Tannin and potassium bicarbonate freely. Warmth, free stimulation, prolonged artificial respiration, electricity. Strychnine and atropine hypodermically. Nitro-glycerin is a rapid and perfect antidote.

THERAPEUTICS

Externally.—Gelsemium is rarely used now as a dilator of the pupil. Atropine and homatropine are used in its place. However, ophthalmic discs containing gelsimine $\frac{1}{600}$ gr. each are obtainable.

Internally.—Gelsemine is really a valuable medicine in **dental neuralgia** and **migraine.** It often relieves the former even when the cause is not removed. Its effects are most marked in **neuralgia** of the branches of the **5th nerve** supplying the lower jaw. It may be given alone or better still with butyl-chloral hydrate (*q.v.*), gelsemine hydrochloride $\frac{1}{200}$ gr. with pilula butyl-chloral (see p. 287) makes an excellent combination, and may be given every two or three hours until the pain is relieved. Sometimes it requires to be pushed till the physiological symptoms appear. It is said to benefit **ovarian neuralgia** nnd **dysmenorrhœa.** Ringer found the tincture in 10 ms. doses, would relieve some forms of **Meniere's disease** and in 5 ms. doses every ½ hour, the **pain of gallstones.** As an antispasmodic in **spasmodic coughs, asthma, tetanus,** &c., it is rarely used now.

Caution—The drug should be used with great care. It should be immediately stopped, as soon as ptosis or weakness of the muscles are noticed. Its value as a muscular depressant is negatived by other untoward effects. Extra precaution should be taken while prescribing its alkaloids, as **serious mistakes** may occur during dispensing. **Gelsemine** is often mistaken for **gelseminine.**

GENTIANÆ RADIX.

Gentian Root. N.O. *Gentianaceæ.*

Habitat.—The Central and Southern European Mountains.

Source.—The dried rhizome and roots of *Gentiana lutea.*

Characters.—In yellowish brown, entire or longitudinally split, wrinkled, cylindrical pieces, seldom 1 in. thick, varying in length, encircled by leaf-scars and terminated by a leaf-bud. Tough when moist, brittle when dried. Fractured surface reddish-yellow, central portion soft, not radiate. Odour characteristic. Taste first sweetish then bitter. Should not yield *reactions with starch.*

Identification.—It should not be confounded with Belladonna, and

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pyrethrum roots. Their distinguishing characters can be better studied by a reference to the following table :—

CHARACTERS.	GENTIAN.	BELLADONNA.	PYRETHRUM.
Colour ...	Yellowish-brown externally, reddish-yellow* internally.	Pale grayish-brown externally, white and starchy internally.	Brown, with shining black points internally.
Fractured surface ...	Central portion soft, not radiate. An irregular, dark red ring near the outside bark.	Near to the cambium ring scattered group of vessels and fibres not radiate. Not annular ring. Some cells contain crystals of calcium oxalate.	Traversed by large medullary rays with dark points.
Odour ...	Fragrant, characteristic, which itself may distinguish it.	*Nil.*	Characteristic.
Taste ...	Sweetish at first, very bitter afterwards.	...	Causes a pricking sensation and salivation.

Composition.—(1) *Gentio-picrin*, the active principle, a bitter glucoside which splits up into (*a*) glucose, (*b*) gentiogenin. (2) *Gentianic* or *gentisic acid* combined with gentio-picrin. (3) *Gentianose*, a sugar, (4) *Gum.* (5) A *Volatile oil.* No tannin.

Incompatibles.—Iron and lead salts, silver nitrate. Gentian, though it contains no tannin, cannot be prescribed with iron as it darkens the mixture.

Action.—Stomachic, bitter tonic.

OFFICIAL PREPARATIONS.

1. **Extractum Gentianæ.**—Aqueous. **B.P. Dose.**—2 to 8 grs.
2. **Infusum Gentianæ Compositum.**—1 in 80.
B. P. Dose.—½ to 1 oz.
3. **Tinctura Gentianæ Composita.**—1 in 10. Golden brown.
B.P. Dose.—½ to 1 dr.

NON-OFFICIAL PREPARATION.

1. **Inf. Gentianæ Comp. Con. B.P.C.**—Gentian 2, bitter orange peel 2, lemon peel 1, tincture of fresh lemon peel 1, alcohol (90 p. c.) 4, water *q.s.* to 1 pint. By maceration. 1 equal to 8 of the B.P. infusion. *Dose.*—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Its actions and uses are similar to those of calumba (*q.v.*). It is more frequently used than other bitters for its non-astringency.

* If dried in an oven it is black. C. & D., 1897, vol. II, page. 198.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

According to Whitla the infusion with a mineral acid checks **vomiting of pregnancy** and **retching** remarkably well. The writer has seen it constipate, but how this occurs he cannot explain.

GLUCOSE. (Non-official).

Syn.—Dextrose. Grape Sugar.
Source—By acting upon starch with dilute hydrochloric acid.
Characters.—White lumps or a thick sticky mass.

Pharmacology and Therapeutics.

Externally.—The injection of a 5 p.c. solution (which is isotonic with blood) into the loose tissue of the axilla is a valuable method of treatment of **shock following severe operations, the collapse of cholera, and wasting diseases.** It is undoubtedly far more valuable than the ordinary injection of normal saline solution and deserves to be more extensively used. Glucose tubes are obtainable, each of which will make one pint of injection.

Internally.—Glucose is a valuable article of diet in **enteric fever,** and serves to counteract the emptiness of the glycogen reservoirs which is such a marked feature of this disease.

GLUSIDUM. Gluside.

$$C_6H_4<\begin{matrix}CO\\SO_2\end{matrix}>NH.$$

Syn. B.P.—Glucusimide. **Syn. Commercial.**—Saccharin.
Source.—Gluside or Benzoyl sulphonimide is a sweet imide derived from toluene, a derivative of coal-tar.
Characters.—A light, white, minutely crystalline powder. Taste intensely sweet in dilute solutions. *Solubility.*—1 in 400 of cold, and 1 in 24 of boiling water; 1 in 25 of alcohol (90 p.c.), slightly in ether and chloroform, also in diluted solutions of ammonia and bicarbonate of soda. *Impurities.*—Sugar, Sulphamido-benzoic acid.
Action.—Antiseptic. A substitute for sugar. *Dose.*—½ to 2 grs.

Non-Official Preparations.

1. **Soluble Gluside.** *Syn.—Saccharinum Solubile.*—90 p. c. in combination with soda. In yellowish white granules easily soluble and more palatable. *Dose.*—½ to 2 grs.
2. **Elixir Glusidi. B.P.C.**—Saccharin 480 grs., Sod. Bicarb. 240 grs., Alcohol (90 p.c.) 2½ ozs., Water *q.s.* Mist, dissolve and filter to 1 pint. 1 dr. equal to 3 grs. 20 ms. are sufficient to sweeten 4 ozs. of a mixture. *Dose.*—5 to 20 ms.
3. **Saccharini Tabellæ (discs).**—½ gr. in each.
4. **Diabetin.** *Syn.—Levulose, Inverted Sugar.*—Whitish crystalline powder soluble in water, with a strong sweetening power, suitable for diabetic patients.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

In large doses, gluside is an **antiseptic** and passes out with the urine unaltered. It is chiefly used for its sweetening property to cover the taste of unpleasant drugs, and as a substitute for sugar in **diabetes, obesity, dyspepsia,** &c. For its antiseptic action it is useful in cystitis. Soluble gluside being more palatable is better suited for flavouring purposes, as ordinary saccharin leaves a disagreeable after-taste.

GLYCERINUM. Glycerin.

$C_3H_5(HO)_3$.

Source.—Glycerin or Glycerol is a trihydric alcohol with a small percentage of water. Obtained by the interaction of alkalis, or of superheated steam, with fats and fixed oils.

Characters.—A clear, colourless, inodorous, sweet, syrupy liquid, miscible with water and alcohol (90 p. c.); insoluble in ether, chloroform and fixed oils. It is neutral, hygroscopic, sp. gr. 1·260. *Impurities.*—Arsenic, copper, lead, iron, calcium, sodium, potassium, ammonium, chlorides, sulphates, cane and grape sugar, butyric acid, fixed mineral matter, and organic matter.

Identification.—The colourless *oily* appearance, the absence of smell and the sweet taste help diagnosis. Most of the B. P. liquids are oily and have characteristic odours.

Action.—Antiseptic, emollient, demulcent. **B.P. Dose,**—1 to 2 drs.

Enters into.—The preparation of all Glycerins (see table p. 26), all Lamellæ (see table p. 30), Conf. Sulph., Ext. Cinch. Liq., Ext. Sarsa. Liq., Lin. Pot. Iod. c. Sapone, Liq. Ethyl Nitratis, Liq. Thyroid., Lotio Hydr. Nig., Mel Boracis, Pil. Ferri, Pil. Quin. Sulph., Syr. Pruni Virg., Tr. Chlor. et Morph. Co., Tr. Kino, Tr. Rhei Co., Ung. Acid. Carbol., Ung. Iodi, Ung. Sulph. Iod., and the

Official Preparation.

1. **Suppositoria Glycerini.**—70 p. c. Translucent cones. Prepared by softening gelatin ½ oz. in water and dissolving it in glycerin 2½ ozs., on a water-bath, and evaporating till the mixture weighs 1,563 grs., when it is poured into moulds.

Non-Official Preparations.

1. **Glycerin Jelly.**—Gelatin 140 grs., Rose water 6 ozs., soak and dissolve, and add white of egg ¼ oz. Heat, and add Glycerin 6 ozs., and Salicylic acid 12 grs. Mix, filter and bottle when warm. Useful in chapped hands, cracked lips and nipples, and for the toilet.

2. **Glycero-alcohol.**—Glycerin 333, distilled water 146, Alcohol (95 p. c.) *q.s.* to measure 1000. It keeps indefinitely without evaporation. Recommended as a solvent for alkaloids and active principles by the French.

3. **Glycerinum c. Aqua Rosæ.**—Glycerin 2, Rose water 3. Mix. A pleasant emollient for the skin.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

4. **Glyceritum Vitelli U.S.** *Syn.—Glyconin.*—Yolk of Egg 45, Glycerin 55. An application to burns, cracked nipples &c.

5. **Antiphlogistine.**—A pasty mass, said to extract fluid from the tissues and to relieve pain in pneumonia, pleurisy &c., contains Glycerin, Boric and Salicylic Acid, Iodine, Ferrous carbonate and various aromatic oils, with an earthy basis.

6. **Thermofuge.**—A somewhat similar preparation. Used as a substitute for poultices.

PHARMACOLOGY.

Externally.—Glycerin adheres to the surface to which it is applied, and **absorbs moisture.** It keeps the parts moist and does not itself evaporate. It readily penetrates the unbroken skin and carries with it many substances, such as alkaloids, neutral principles, alkalis, &c., when mixed with it. It is a powerful **antiseptic,** an **emollient,** and a **demulcent.** It renders the skin supple, especially when diluted with water, and allays burning or tingling. Undiluted glycerin is an **irritant** to the mucous surface, and occasionally to the skin.

Internally. **Alimentary canal.**—Undiluted glycerin makes the mouth clammy and sticky. It is a nutrient, because a portion of it when swallowed is absorbed and oxidised in the body, or may go to form adipose tissue. Hence, when continued for a long time, it is sometimes seen to increase body-weight. It is doubtful whether it can affect the metabolism of nitrogenous tissues, but there is evidence that it cannot. In large doses it acts as a **laxative.** Injected into the rectum, it moves the bowels by increasing vermicular contraction of the rectum and the lower bowels by its local irritant effects.

Liver.—Glycogenic function may to some extent be influenced, but it is doubtful whether artificial glycosuria can be prevented.

Blood.—It is freely absorbed by all surfaces. Large doses given to animals cause destruction of red corpuscles, and the hæmoglobin is dissolved in the plasma, leading to **hæmoglobinuria.** It is probable that the marked tendency to hæmorrhages which is seen in various forms of Pancreatic disease is due to the circulation in the blood of glyceryl derivatives, derived from the areas of "fat-necrosis", which have been produced by the action of steapsin upon the subperitoneal fat.

Elimination.—Glycerin is excreted from the body as propionic, formic and other acids. The urine of persons taking glycerin gives the copper and fermentation tests for sugar, due to the appearance of a reducing product which is not sugar. After very large doses, the urine becomes dark from the presence of hæmoglobin.

PHARMACEUTICAL USES AND THERAPEUTICS.

Pharmaceutically.—On account of its valuable physical properties, glycerin is peculiarly fitted for pharmaceutical and dis-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

pensing uses. It makes an excellent all round excipient for pills when combined with acacia or tragacanth mucilage (see p. 86). It is used in the preparation of suppositories, pessaries, pastils, jellies, glyco-gelatine preparations and ointments; and a solvent for many alkaloids, active principles, acids, alkalis, neutral salts, glucosides, iodine, bromine, &c. It is a valuable adjunct to lotions for the skin and the hair. As a flavouring agent it is largely employed as a substitute for syrups in mixtures, and as a preservative for organic preparations, such as thyroid solution. As a sweetener and preserver of mixtures it is admirably suited to the Indian climate.

Externally.—As an *emollient*, glycerin diluted with water (1 in 3) or glycerin c. aquæ rosæ is the best application for **chapped lips** and **hands, rough, dry, furfuraceous skin**, and for every kind of skin disease, such as **herpes, eczema, lichen, psoriasis, xeroderma**, &c, which requires an emollient. Mixed with boric acid it is serviceable in **pityriasis** of the body and scalp, and **aphthous** condition of the genitals. It removes dryness of the **meatus** of the **ear**, and heals **excoriation** and **fissures**. It is the best preventive for **bedsores**, when gently rubbed into the parts, before they become tender and red. A 5 p.c. solution of both glycerin and Friar's balsam in rose water prevents a further breaking out of **acne**, when once it is checked. Cotton wool soaked in glycerin and applied to the **os uteri**, by causing a copious watery discharge, relieves congestion of that organ. Many anodynes and antiseptics may be applied similarly by dissolving them in glycerin.

Internally. **Alimentary canal.**—The lips, the tongue and the gums covered with sordes, as in acute febrile diseases, are easily cleaned by keeping them moist with glycerin. The dry, red, glazed mucous membrane of the tongue and throat is made moist and supple by rinsing the mouth with glycerin and water, and thus relieving any **reflex cough** if present. As a **laxative** it is never used by the mouth, but the writer always combines it with castor oil to render it less disagreeable and more effective. Glycerin (1 to 4 drs.) may be injected into the rectum by a special syringe to open the bowels in **constipation**. A suppository may conveniently be used for the same purpose and is particularly useful in cases where there is a prejudice against the use of enemata. Suppositories of this kind are obtainable under the name of "glycerin enules." The injection of glycerin is contra-indicated in **piles** and is useless if the fæcal accumulation is very high up.

Lungs.—A tea-spoonful of glycerin alone or diluted with water often relieves **cough**, even that of phthisis. A little lemon juice added to it, makes it more efficacious and moderates its sweetness. Glycerin connot supply the place of cod-liver oil, but it can be usefully combined with it.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

GLYCYRRHIZÆ RADIX.

Liquorice Root. N. O. *Leguminosæ.*

Syn. I. V.—*Jashthimadhu*, Beng. *Mulealhti*, Hind.

Habitat.—Southern Europe, England, Persia, Afghanistan, India.

Source.—The peeled root and peeled subterranean stem of *Glycyrrhiza glabra*, and other species.

Characters.—Long, cylindrical, before being peeled dark brown and longitudinally wrinkled; when peeled yellow, fibrous. Odour faint. Taste characteristic, sweet, free from bitterness.

Identification.—It somewhat resembles pyrethrum and taraxacum, which are not sweet. In India the root of *Abrus precatorius* is often sold for the B. P. root.

Composition.—(1) *Glycyrrhizin*, a yellow amorphous glucoside. (2) *Asparagin*. (3) Grape sugar, resin, starch, malic acid, &c.

Action.—Demulcent, a sweetening agent.

Enters into.—Liq. Sarsa Co. Con., Pil. Hydrarg. and the

Official Preparations.

1. **Extractum Glycyrrhizæ.**—An excipient.—*Dose.*—5 to 30 grs. *Enters into.*—Conf. Sennæ, and Decoc. Aloes Co.

2. **Extractum Glycyrrhizæ Liquidum.**—The product is usually acid. Ammonia may be added as a preservative. **B. P. Dose.**—½ to 1 dr. *Enters into.*—Mist. Sennæ Co. and Tr. Aloes.

3. **Extractum Glycyrrhizæ Spirituosum.** (*Ind. and Col. Add.*).—Extract of Liquorice 10 ozs., Alcohol (90 p.c.) 5 ozs, Water *q.s.* to 1 pint. By solution. **B. P. Dose.**—½ to 1 dr. For use in India and Eastern colonies. Keeps better than the liquid extract.

4. **Pulvis Glycyrrhizæ Compositus.**—1 in 6. Amild aperient. **B.P. Dose.**—1 to 2 drs.

Non-Official Preparation.

1. **Glycyrrhizinum Ammoniatum. U.S.**—Glycyrrhizin precipitated from an aqueous solution, purified and recombined with Ammonia. Garnet coloured shining scales having the persistent sweet taste of Liquorice One grain will suffice to flavour six ounces of water.

Dose.—½ to 5 grs.

Pharmacology and Therapeutics.

Internally.—Being sweet it increases the flow of saliva. It is an excellent **demulcent**, and is largely employed in relieving **sore-throat**, for which pieces of "stick liquorice" are kept in the mouth. The dried root has no laxative effect, but Pulv. Glycyrrhizæ. Co. is a mild laxative in virtue of its senna aud sulphur. Liquorice makes an excellent excipient and disguises the taste of many nauseous drugs such as aloes, ammonium chloride, cascara sagrada, senna, senega, turpentine, and many bitter substances.

GOSSYPIUM. Cotton.

N. O. *Malvaceæ.*

Syn.—Cotton-Wool. **Syn. I.V.**—*Tulla*, Beng, *Rui*, Hind.

Habitat.—Warm and Tropical Countries. Cultivated in India.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—The hairs of the seeds of *Gossypium barbadense* and the species of *Gossypium*, from which fatty matter has been removed. Commonly known as "absorbent cotton-wool."

Characters.—Well known. It should be readily wetted by and quickly sink in water.

THERAPEUTICS.

Externally.—The economic uses of cotton are well known. It is chiefly used as a padding for splints, and as a protective covering for **blistered, burned or inflamed surfaces,** as in rheumatism, gout, erysipelas. &c A thick layer surrounding the entire limb, and covered with a piece of oil-silk and bandaged, is the best local treatment in **phlegmasia dolens.** In the same way a cotton-wool jacket is very useful in the treatment of **bronchitis, pneumonia, pleurisy,** &c. Cotton wool medicated with boric, carbolic and salicylic acids, thymol, iodoform, eucalyptol, sal alembroth, &c., is employed as an antiseptic dressing. Sterilised cotton is the best substitute for corks in bacteriological experiments. Pyroxylin is used for making collodion (see p. 359).

PYROXYLINUM. Pyroxylin.

$C_6H_8(NO_2)_2O_5$.

Source.—It is dinitrocellulose, though commonly called gun-cotton which is trinitrocellulose, prepared by immersing cotton 1, in a mixture of sulphuric acid 5, and nitric acid 5, for 3 minutes, and then washing, draining and drying on a water-bath.

Solubility.—Readily in a mixture of equal volumes of ether and alcohol (90 p.c.).

Enters into.—Collodium, Collodium Flexile, Collodium Vesicans. (See p. 359)

Dispensing hints.—Becomes sometimes insoluble on keeping. It is best preserved by moistening the cotton with methylated spirit and placing it in a well-stoppered jar. Dry it before use.

GOSSYPII RADICIS CORTEX.

Cotton Root Bark.

(*Ind. and Col. Addendum.*).

Habitat.—India, Eastern, North American and Western Colonies.

Source.—The dried root-bark of *Gossypium herbaceum.*

Characters.—In thin flexible bands, or quilled pieces, covered with a thin brownish-yellow periderm. Inodorous. Taste slightly acrid astringent.

OFFICIAL PREPARATIONS.

1. **Decoctum Gossypii Radicis Corticis.**—Bark bruised 4 ozs., ater 2 pints. Boil down to 1 pint. **B.P. Dose.**—½ to 2 ozs.
2. **Extractum Gossypii Radicis Corticis Liquidum.**—1 in 1. Bark 20 ozs., Glycerin 5 ozs., Alcohol 90 (p.c.) q. s. Percolate to 1 pint. **B.P. Dose.**—½ to 1 dr.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

NON-OFFICIAL PREPARATIONS.

1. **Extractum Gossypii Radicis Corticis**.—Semi-alcoholic preparation. *Dose.*—1 to 4 grs.

2. **Pilula Gossypii Composita**.—Ext. Gossyp. Cort., Ext. Hydrastis, Ergotin, of each 1 gr. For congestive dysmenorrhœa.

Dose.—1, three or four times a day.

PHARMACOLOGY AND THERAPEUTICS.

Internally.—It is largely employed in America as a substitute for ergot, though its effects are not so rapid or reliable.

GRAMINIS CITRATI OLEUM.

Oil of Lemon Grass.

N. O. *Gramineæ.* (*Ind. and Col. Addendum.*)

Syn. B.P.—Indian Oil of Verbena. **Syn. I.V.**—*Gandha Bena tel*, Beng. *Rusa ka tel*, Hind.

Habitat.—India, Eastern and West Indian Colonies.

Source.—The oil distilled from *Andropogon citratus* (*Andropogon Schœnanthus*).

Characters.—A dark yellow oil. Odour resembling that of verbena. Sp. gr. 0·895 to 0·905.

Composition.—(1) *Citral.* (2) Citronellal &c.

B.P. Dose.—½ to 3 ms.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—It is a **rubefacient** like oil of cajuput and may be used diluted with a bland oil in **lumbago, myalgia, rheumatism**, &c. It may be used undiluted in chronic cases. It disguises the smell of iodoform. It is largely employed in perfumery and in adulterating verbena oil which it resembles.

Internally.—As a **stimulant** and a **carminative** it may be used like other aromatic oils. In **cholera** it is said to arrest thirst and to aid the process of reaction.

GRANATI CORTEX.

Pomegranate Bark. N. O. *Lythraceæ.*

Syn. I. V.—*Dárim gácher chhál*, Beng. *Anár ka chhál* Hind.

Habitat.—Southern Europe, Central Asia, cultivated in India.

Source.—The dried bark of the stem and root of *Punica granatum.*

Characters.—In curved or channelled pieces, 2 to 4 in. long, ½ to 1 in. wide. Outer surface of the root bark rough, yellowish-grey with irregular depressions. Stem-bark smoother, bearing minute lichens. Inner surface yellow, tinged with brown. Inodorous. Taste astringent, slightly bitter.

Composition.—The root-bark contains the most alkaloids, more so in that of the red-flowered and white-flowered varieries. (1) *Pelletierine* or *Punicine*, a liquid volatile alkaloid. (2) *Isopelletierine* or

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

isopunicine. (3) *Methylpelletierine.* (4) *Pseudopelletierine.* The first two are active and constitute the medicinal pelletierine, and the last two are inert. (5) *Punico-tannic acid.*

Incompatibles.—Alkalis, metallic salts, lime water, gelatin.

Action.—Astringent, tæniafuge.

Official Preparation.

1. **Decoctum Granati-Corticis.**—1 in 5 (10 minutes).

B.P. Dose.—½ to 2 ozs.

Non-Official Preparations.

1. **Pelletierinæ Sulphas.**—A viscid soluble liquid.

Dose.—5 to 8 grs. with the same quantity of tannic acid.

2. **Pelletierinæ Tannas.**—A yellowish amorphous powder insoluble in water. *Dose.*—5 to 8 grs.

Pharmacology.

Internally.—The bark and the rind of the fruit are **astringent.** The bark, especially the root-bark, is also a valuable **anthelmintic** for tape-worm. In large doses it causes vomiting and purging. Pelletierine sulphate being soon absorbed by the stomach cannot kill the parasite in the intestine, but in large doses, produces certain constitutional symptoms such as dimness of vision, giddiness, muscular weakness and twitchings, &c. These symptoms do not follow the use of the sulphate when combined with tannic acid.

Therapeutics.

Internally.—The decoction of the fresh root-bark is a valuable **tæniafuge.** It should be given every ½ or 1 hour after fasting, or better still after a dose of castor oil and continued even when vomiting takes place. A brisk purgative, such as compound jalap powder should follow its use. Pelletierine salts may be used successfully for the same purpose and with the same precautions. Only fresh salts are reliable as they deteriorate on keeping.

The rind of the fruit is a valuable remedy for **diarrhœa** and **dysentery** The writer often uses it with good results alone in diarrhœa, and with the rind of *mangosteen* fruit (*Garcinia mangostina*) and with *kurchi* bark (*Wrightia antidysenterica*) in the form of decoction in dysentery. The fresh juice of the succulent seeds is much used as a **cooling beverage** in febrile and other diseases.

GRINDELIA. Grindelia.

N. O. *Compositæ.* (*Ind and Col. Addendum.*)

Habitat.—Australasian and North American Colonies.

Source.—The dried leaves of *Grindelia squarrosa* and *Grindelia robusta.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—The *leaves* of *Grindelia squarrosa* are alternate, pale-green, smooth, coriaceous, brittle, oblanceolate; and at the sessile base the involucral bracts are long with reflexed subulate points. The *leaves* of *Grindelia robusta* are almost similar, but shorter and have a cordate amplexicaul base and a serrated margin. Odour balsamic. Taste pungently aromatic, bitter.

Composition.—(1) A *Volatile oil.* (2 A *Resin*, allied to saponin. (3) Probably an alkaloid.

Official Preparation.

1. **Extractum Grindeliæ Liquidum.**—1 in 1. By percolation with alcohol (90 p c.), water, and sodium bicarbonate.

B.P. Dose.—10 to 20 ms.

Non-Official Preparations.

1. **Extractum Grindeliæ.**—Alcoholic. *Dose.*—2 to 3 grs., in pill form, with lycopodium.

2. **Tinctura Grindeliæ.**—1 in 8 of alcohol (90 p. c.). Requires a suspending agent, to prevent precipitation of resin. *Dose.*—1 to 2 drs.

3. **Mistura Grindeliæ.**—Ext. Grendel. Liquid. 30 ms., Ext. Glycyrrhiz. liquid. 1 dr., Sp. Chlorof. 5 ms., Mucilage 2 dr., Syrup 30 ms. water 1 oz.

Pharmacology.

Externally.—It is a local stimulant.

Internally. **Stomach.**—It locally stimulates the stomach and acts as a mild stomachic, and if continued too long, it may cause gastric uneasiness.

Remote action.—After absorption it slows the heart and respiration, but its chief action is on the bronchial mucous membrane which it stimulates, and on the muscular fibre of the bronchial tubes, which it relaxes. It is therefore an **expectorant** and a **bronchial antispasmodic.** In large doses it powerfully depresses the respiratory and cardiac centres, dilates the pupil and causes sleep. The cutaneous sensibility and reflex movements are lessened, and there is incomplete paralysis of the limbs. The oleo-resin is mainly excreted by the kidneys which it stimulates, thus acting as a mild **diuretic.**

Therapeutics.

Externally.—A lotion (1 dr. of the liquid extract in 6 ozs. of water) makes a useful dressing for **burns** and **ulcers**, and as an injection in **urethritis** and **leucorrhœa.** In America, cloths steeped in it are applied to the skin in **dermatitis** caused by the poisonous ivy (*Rhus toxicodendron*).

Internally.—Its chief use is in **asthma**, 20 or 30 ms. of the liquid extract given every half or one hour, relieve a paroxysm after two, three or four doses The dried leaves mixed with nitre may be burnt and the fumes inhaled with advantage. It has been found equally serviceable in **spasmodic bronchitis, emphy-**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

sema, whooping cough and other spasmodic respiratory troubles. In full doses it is said to arrest chronic pyelitis and chronic cystitis. Grindelia squarrosa has also been found useful in ague, neuralgia, enlarged spleen, &c.

GUAIACI LIGNUM.

Guaiacum Wood. N. O. *Zygophylleæ*.

Habitat.—St. Domingo, Jamaica.

Source.—The heart-wood of *Guaiacum officinale*, or of *Guaiacum sanctum*.

Characters.—Dark greenish-brown, dense, hard, heavier than water. Taste acrid. Odour when heated aromatic.

Composition.—(1) A *Resin* (*off*). 26 p. c.

Enters into.—Liq. Sarsæ Compositus Conc.

GUAIACI RESINA.

Guaiacum Resin.

Source.—Obtained from the guaiacum wood.

Characters.—In large masses or sometimes in rounded tears, yellowish-brown to reddish-brown, brittle, breaking with a clean glassy fracture. Thin splinters transparent. Powder greyish, but becomes green by exposure to light and air. *Impurity.*—Colophony (resin). *Solubility.*—About 90 p.c. is soluble in absolute alcohol, chloroform, ether, aromatic spirit of ammonia, and alkaline solutions.

Identification.—The greenish colour of the masses, the glassy fracture and the absence of marked odour are characteristic. The student should compare it with aloes, myrrh, benzoin, resin and scammony, which have no greenish tinge, and have characteristic odours. The powdered guaiacum resin is greyish green and has a characteristic odour.

Composition.—Complex. Contains several resin acids—(1) *Guaiaconic*, (2) *Guaiacic*, and (3) *Guaiaretic acids*. (4) *Guaiac Beta Resin* (5) *Guaiac yellow*.

Incompatibles.—Mineral acids, spirit of nitrous ether.

Action.—Stimulant, diaphoretic, alterative. **B.P. Dose.**—5 to 15 grs.

Enters into.—Pil. Hydrag. Subchlor. Co., and the

Official Preparations.

1. **Mistura Guaiaci.**—11 grs. in 1 oz. **B.P. Dose.**—½ to 1 oz.
2. **Tinctura Guaiaci Ammoniata.**—1 in 5. **B.P. Dose.**—½ to 1 dr.
3. **Trochiscus Guaiaci Resinæ.**—3 grs. in each.

Non-Official Preparations.

1. **Tr. Guaiaci. B.P.C.**—Guaiacum 4 ozs., Alcohol (90 p.c.), *q. s.* to 1 pint. by solution. *Dose.*—½ to 1 dr.
2. **Chelsea Pensioner.**—The original formula has undergone much modification. The following is commonly used:—Pulv. Guaiaci Res. ½ oz., Pulv. Rhei 2 drs., Pulv. Pot. Nitras 1 oz., Sulphur Sub. 1 oz., Pulv. Sinapis 1 oz., Mel *q. s.* M. T. Elect. In chronic rheumatism and chronic gout. *Dose.*—1 to 2 tea-spoonfuls night and morning.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY.

Internally.—Guaiacum resin having an acrid pungent taste increases the flow of saliva. It produces a sensation of warmth in the throat and in the stomach, and increases the movements and the secretion of the stomach and bowels. In large doses it is a **gastro intestinal irritant**, causing vomiting and purging. It reflexly stimulates the heart. It stimulates the action of the kidneys, of the skin, and slightly of the liver, and is therefore a mild **diuretic, diaphoretic** and **cholagogue.** Some think it is an **emmenagogue** too. According to Garrod, it frequently in gouty subjects produces a copious elimination of uric acid in the form of urates.

THERAPEUTICS.

Internally.—Its usefulness is most conspicuous in acute **tonsillitis**, almost ranking with aconite or sodium salicylate. The lozenge, taken several times a day, relieves **follicular pharyngitis.** It is recommended in **lumbago, sciatica, neuralgic** and **rheumatic dysmenorrhœa, amenorrhœa** and **chronic rheumatism.** Sir Alfred Garrod praises it in **subacute** and **chronic gout.** According to him it relieves patients suffering from gouty inflammation of a part, if given when they are not very feverish; and acts as a *prophylactic*, if given in the intervals of gouty attacks. As a prophylactic he administers, every morning for years without harm, either 10 or 12 grs. of the powdered resin with or without potassium iodide, washed down with an effervescent draught of citrate of lithium, or else lithium guaiacate 5 grs. in pill twice daily. In many chronic rheumatic affections of the joints Chelsea pensioner is a favourite remedy. In **syphilis** it is entirely valueless.

Prescribing hints.—The powdered resin is best given in cachets, and the ammoniated tincture in milk or sherry, emulsified with mucilage and syrup. Many consider guaiacum mixture to be more effective than the tincture.

GUARANA.

(Non-Official.)

Habitat.—Brazil.

Source.—The seeds of *Paullinia Cupana* (*P. Sorbilis*), roasted and made into a hard paste with water.

Characters.—In cylendrical pieces.

Composition.—(1) *Guaranine*, a crystalline alkaloid, identical with caffeine. *Dose.*—½ to 5 grs., or more. (2) Tannin. (3) Gum.

Action.—Nervine tonic. *Dose.*—10 to 60 grs.

NON-OFFICIAL PREPARATIONS.

1. **Elixir Guaranæ B.P.C.**—Guarana 4 ozs., Mag. Levis ½ oz. Ol. Cinnamom. 6 ms., Syrup 2 ozs., Alcohol (60 p. c.) q. s.
Dose.—½ to 2 drs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. **Tinctura Guaranæ.**—1 in 4, with alcohol (60 p. c.). *Dose.*—½ to 1 dr.

PHARMACOLOGY AND THERAPEUTICS.

Guarana contains twice as much caffeine as tea, and five times as much as coffee. It is a valuable remedy for **sick-headache**, but large doses are necessary (30 to 60 grs). Also used in **diarrhœa** and **dysentery**.

GUMMI INDICUM.

Indian Gum. (*Ind. and Col. Addendum.*)

Habitat.—India, Eastern Colonies.

Source.—A gummy exudation from the wood of *Anogeissus latifolia*.

Characters.—In vermiform or rounded tears, amber coloured, translucent, with a dull surface. Fracture glassy. *Solubility.*—In water, forming mucilage.

OFFICIAL PREPARATION.

1. **Mucilago Gummi Indici.**—Gum 2 ozs., Water 6 ozs. Dissolve.

PHARMACOLOGY AND THERAPEUTICS.

In India and Eastern Colonies, Indian gum may be used in making official preparations for which gum acacia is prescribed, (see p. 168).

GYNOCARDIÆ OLEUM.

Gynocardia Oil. N.O. *Bixineæ*.

(*Ind. and Col. Addendum.*)

Syn. B. P.—Chaulmoogra Oil. **Syn. I.V.**—*Chalmugra tel*, Beng., Hind.

Habitat.—Found in the forests of the Malayan Peninsula and of the lower Himalya, as far north as Sikkim, and thence as far east as Chittagong and Rangoon.

Source.—The fatty oil expressed from the seeds of *Gynocardia odorata*, or of *Gynocardia Prainii*.

Characters.—Brownish-yellow* of varying consistence. Odour characteristic. Taste acrid. Liquefies fully at 107·6 F., resolidifying at different temperatures down to 60° F. *Solubility.*—Partly in alcohol (90 p.c.), freely in ether, chloroform and carbon bisulphide.

Composition.—(1) *Gynocardic acid*, 21.7 p.c. is the active principle. (2) *Palmitic acid*, 63 p.c. (3) *Hypogæic acid*, 4 p.c. (4) *Cocinic acid*, 2.3 p.c.

---

* The oil obtained by cold expression is clear, of a pale sherry colour; and that by hot expression, as seen in the bazars, is more or less dark, thick, containing a whitish deposit of fatty substances and impurities. The oil expressed from the seeds of *Hydrocarpus Wightiana* is sometimes substituted for chaulmoogra oil.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Action.—Alterative. **B.P. Dose.**—5 to 10 ms., gradually increased to from ½ to 1 dr.

Official Preparation.

1. **Unguentum Gynocardiæ.**—Oil 50 grs., hard Paraffin 200 grs., soft White Paraffin 250 grs. Melt and mix.

Pharmacology.

Externally.—Chaulmoogra oil when rubbed into the skin stimulates the local circulation and the local nerves. If rubbed too long or every day for some time, it is a **rubefacient.**

Internally.—The effect of chaulmoogra oil depends upon its active ingredient *gynocardic acid.* In the beginning, with many it causes loss of appetite, nausea, and even vomiting and purging; but the stomach becomes soon habituated to its use. After absorption, it acts as an **alterative,** probably by slowly modifying the local nutrition of the morbid leisons and thereby inducing healthier changes in them, and also by improving the general nutrition of the body.

Therapeutics.

Chaulmoogra oil has long been known and used in the East as a remedy for leprosy and other skin diseases, but within the past twenty years, the knowledge of it has spread to the West, and its value has been admitted in **leprosy, eczema, lupus, scrofula, phthisis, rheumatism,** and **gout** The remedy is employed both externally and internally, and the patient taking it must live generously, as the weak and the underfed are liable to gastric derangement. To test its efficacy in leprosy, a commission was appointed in 1890-91, and from the evidence recorded, it appears to be the best **palliative** and superior to gurjun oil (oil of *dipterocarpus*). The writer considers it more effective in recent cases of leprosy than in old ones, aborting the disease after six months to one year's treatment. He rubs the oil into the diseased patches and gives it internally, gradually increasing the dose to 1½ drs. He finds better results, if it is given with small doses of arsenic, and if the external application is a mixture of equal parts of chaulmoogra oil and *neem* oil (oil of *Melia azadirachta,* see p. 258). Where the stomach cannot bear the oil, *gynocardic acid* in ½ to 3 grs. or *magnesium gynocardate* in 1 to 3 grs. may be given with the same results. As a remedy for other diseases, it has not proved a success except in **chronic eczema,** as a stimulating local application.

Prescribing hints.—Chaulmoogra oil should be given after food in capsules (5 ms. in each), floating on warm milk, or in sweetened emulsion to which a few drops of lemon oil have been added. The after-taste is very well removed by the sucking of a fresh cut lemon. In India the oil is fluid, but in England it is solid. The dose should be gradually increased, and its adminis-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

tration should be suspended if the stomach becomes irritated. The writer has increased the dose gradually to 90 ms. without causing gastric disorder.

HÆMATOXYLI LIGNUM.

Logwood. N. O. *Leguminosæ.*

Habitat.—Campeachy, Honduras, Jamaica.

Source.—The heart wood of *Hæmatoxylon campechianum.*

Characters.—Imported in logs or chips. Logs heavy, hard, orange to purplish red externally, and reddish-brown internally. Chips or coarse powder should be unfermented, and have a somewhat agreeable odour, and sweetish astringent taste. When chewed it colours the saliva pink.

Identification.—It resembles red sandal wood, which is more dense, and less astringent.

Action.—Astringent.

Incompatibles.—Mineral acids, lime water, tartar emetic.

Composition.—(1) *Tannic acid.* (2) *Hæmatoxylin,* a colouring principle in colourless crystals, which on exposure to light becomes red.

Official Preparation.

1. **Decoctum Hæmatoxyli.**— 1 in 20. **B.P. Dose.**—½ to 2 ozs. No iron vessel should be used for boiling.

Non-Official Preparation.

1. **Ext. Hæmatoxyli Liquidum. B. P. C.**—*Dose.*—½ to 2 drs.

Pharmacology and Therapeutics.

On account of its tannic acid, logwood is a valuable **astringent,** and is used in those cases where tannin is indicated. It is generally given in **diarrhœa** of both adults and children in combination with opium and other astringents. Rarely it is prescribed alone. It colours both urine and fæces deep red. This is one of the objections to its use, as mothers object to the staining of the children's diapers. The decoction may be used as an injection in **leucorrhœa.** Hæmatoxylin dissolved in alcohol is used for staining histological specimens.

HAMAMELIDIS CORTEX.

Hamamelis Bark. N. O. *Hamameliaceæ.*

Syn.—Witch-hazel bark.

Habitat.—The United States.

Source—The dried bark of *Hamamelis virginiana.*

Characters.—In curved pieces ; $\frac{1}{10}$ in. thick ; 2 to 8 in. long ; sometimes covered with a scaly, silver-grey outer bark, marked with lenticels ; but often free from outer-bark, then exhibiting a smooth, reddish-brown outer surface ; inner surface reddish-pink, striated longitudinally. Taste astringent. Inodorous.

Composition.—(1) *Tannic acid,* 8 p.c. (2) A *Volatile principle* not isolated. (3) *Colouring matter.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparation.

1. **Tinctura Hamamelidis.**—1 in 10. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparation.

1. **Hamamelin.** *Syn.*—*Hamamelidin.*—A Powdered extract. *Dose.*—1 to 5 grs. in pill. A suppository in 1 to 3 grs. with cocoa butter.

HAMAMELIDIS FOLIA.

Hamamelis Leaves.

Source.—The leaves fresh and dried of *Hamamelis virginiana*

Characters.—Broadly oval, 3 to 6 in. long, dark-green or brownish-green above, pale below; apex obtuse; base oblique, cordate and shortly petiolate; margin sinuate; veins pinnate and prominent on the under surface, which is furnished with stellate hairs. Taste astringent, slightly bitter. No odour.

Official Preparations.

1. **Extractum Hamamelidis Liquidum.**—1 in 1. **B.P. Dose.**—5 to 15 ms.
2. **Liquor Hamamelidis.**—1 in 1. **B.P. Dose.**—5 to 15 ms.
3. **Unguentum Hamamelidis.**—1 in 10.

N. B. *Hazeline* and *Pond's Extract* are also distillates of fresh leaves and twigs. *Dose* of the former is ½ to 3 drs., and of the latter 10 drops hourly.

Pharmacology.

The witch-hazel is a **local** and a **remote astringent** and **hæmostatic**, but how it acts we do not know, for though the bark contains tannic acid, yet liquor hamamelidis, which is a distillate and consequently contains no tannin, is as active as the tincture prepared from the bark. Dr. Hector Guy investigated its pharmacology but found that it is neither a tonic nor has any action on the heart, blood-vessels or veins. Drs. Wood and Marshall also could not obtain any physiological effects. It is not a poison, but large doses sometimes cause headache.

Therapeutics.

Externally.—As a local astringent or hæmostatic it has been used in various ways and in various affections. A lotion (tincture or liquor 1 in 4 to 10 of water) is a valuable application to **bruises, wounds** and **sores.** It may be used as a gargle in **sorethroat, bleeding** from the **gums, ulcerative stomatitis,** or as an injection in **gonorrhœa, vesical hæmorrhage, nasal catarrh, epistaxis,** &c. Hamamelis is a most valuable remedy in internal and external **piles.** Equal parts of hazeline and glycerin soaked in cotton and applied to the **ulcerated os** with congested cervix, subdue the inflammation and heal the ulcer. Its applica-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

tion to **varicoceles** and **varicose veins** has apparently given good results.

Internally.—In all forms of **passive hæmorrhage** hamamelis has been found useful. **Epistaxis, hæmoptysis, hæmatemesis, hæmaturia, menorrhagia** and especially **hæmorrhoidal bleeding** yield to it. It relieves the pain of **dysmenorrhœa**, and according to Brunton it is more effective in **hæmoptysis** than either ergot or digitalis, but certainly it cannot rank with calcium chloride. The writer has obtained decidedly good results in dysentery. It arrests hæmorrhage and to some extent also the discharges of that disease. Its efficacy is most marked in those cases in which the vascular tone is lost, as for instance in dysentery attacking persons suffering from chronic malarial fever and hypertrophy of the spleen. Dr. Preston praises it in **phlegmasia dolens**. Many local hæmorrhages are more efficiently checked when the local application of hamamelis is supplemented by its internal administration.

Prescribing hints.—The mode of administration of hamamelis in piles requires a fuller description. In the case of external or externo-internal piles, they should be bathed with cold water *and not wiped*, after each defæcation, so as to remove all offending septic particles. A pledget of cotton-wool (or better still prepared sheep's wool) steeped in the ointment or solution, should then be inserted into the rectum until only one half remains outside so that the sphincter of the anus may grip it in the centre. Thus applied it serves two ends, the upper part of the pledget keeps the medicine applied to piles within the anus, while the lower part of it not only does the same outside the anus, but maintains a gentle pressure over them. In the case of internal piles, the ointment may be introduced by an ointment-introducer or the solution injected by a glycerin syringe. Hamamelin suppositories have not been found so successful. If this treatment is persevered in for several months, it not only permanently relieves but cures piles that are not very large.

HEMIDESMI RADIX.

Hemidesmus Root. N.O. *Asclepiadaceæ.*

Syn.—Indian Sarsaparilla. **Syn. I.V.**—*Anantamul*, Beng. *Magrabu*, Hind.

Habitat.—India.

Source.—The dried root of *Hemidesmus Indicus.*

Characters.—Long, rigid, cylindrical, tortuous, longitudinally furrowed, ¼ in. thick, dark brown. Cork frequently separated and transversely fissured. Odour fragrant. Taste sweetish.

Identification.—It somewhat resembles ipecacuanha, sarsaparilla and senega. Its rigidity, longitudinal furrow and incomplete transverse fissure will distinguish it from either of the above.

Composition.—(1) *Hemidesmine.* (2) *Tannin.* (3) Starch, &c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparation.

1. **Syrupus Hemidesmi.**—1 in 8 by measure.
B.P. Dose.—½ to 1 dr.

Pharmacology and Therapeutics.

The dry root has no action. The fresh root is said to possess **alterative, tonic and diaphoretic** properties, and is often prescribed by the unqualified medical practitioners of this country in **chronic rheumatism, syphilis** and many cutaneous diseases, &c. The writer has found the dry root almost inert. It is strange that it is yet retained in the B.P.

HIRUDO. Leeches.

N. O. *Annelida.*

Syn. I. V.—*Jonk*, Beng. Hind.
Habitat.—Spain, Italy, France, Hungary.
In India there are many distinct species, which are gathered from marshes and tanks.

Source.—Two species are official :—(1) *Sanguisuga medicinalis*, the Speckled Leech, whose belly is greenish-yellow and spotted black ; (2) *Sanguisuga officinalis*, the Green Leech, whose belly is olive-green and not spotted.

HIRUDO AUSTRALIS. Australian Leech.

(*Ind. and Col. Addendum.*)

Source.—Hirudo quinquestriata. The five-striped or Australian leech, whose dorsal surface greenish-yellow-brown with 5 longitudinal stripes, and ventral surface greenish-yellow not spotted.

Pharmacology.

Each leech draws from 1 to 2 drs. of blood, and by subsequent fomentation as much again or more may be abstracted. Its anterior extremity has a sucking disc with a triradiate mouth furnished with sharp teeth, which saw through the skin. The effect of leeching is both local and general depletion. The secretion from the pharynx of the leech prevents coagulation of the blood. For this reason it is sometimes difficult to stop the bleeding from leech bites. The extract also prevents coagulation of the blood, arrests putrefaction and stimulates both leucocytosis and phagocytosis.

Therapeutics.

The tendency of the present day is not to abstract blood. But the opinion is gaining ground that by the absolute rejection of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

leeching, wet-cupping or venesection, a valuable remedy is lost to therapeutics. Leeches are usually applied over deep-seated structures or organs to relieve congestion or pain ; as in **pleurisy, pneumonia, pericarditis, myocarditis, hepatitis, meningitis, cerebritis, ovaritis, pelvic cellulitis, metritis, orchitis, tonsillitis, laryngitis, otitis, arthritis,** &c. As leech extract prevents coagulation of blood, it has been suggested as an injection in **thrombosis** or as an addition to blood before transfusion.

Mode of application and caution.—(1) A fresh, unused, healthy leech should only be used, for if it has once been applied to a septic surface, it may convey infection.

(2) A prominent part that will admit of pressure in case of excessive hæmorrhage, is to be selected. It should then be thoroughly cleaned and dried, and afterwards washed with milk to remove any unpleasant smell of soap or disinfectants.

(3) The leech must not be touched by the fingers of the nurse or attendant. Place it inside a pill box or wine glass, which is then inverted over the selected spot until the leech has attached itself to the skin ; but sometimes it refuses to bite even then. If this happens, a little cream or sugar may be applied to the spot, or the part may be scratched with the point of a needle.

(4) A leech glass or a glass syringe through which its head alone can penetrate, should be used for its application to tonsils, os uteri or rectum.

(5) If it is intended that it should bite a particular spot, a perforated piece of paper may first be spread over the skin, keeping open the definite spot for fastening.

(6) It should not be pulled off but allowed to fall off of its own accord. If it does not, it can easily be dislodged by sprinkling a little salt over it.

(7) In case it crawls down the œsophagus or up the rectum, the patient must immediately be made to swallow a copious draft of salt water, or else it must be injected into the rectum, as the case may require. This usually suffices to effect dislodgement.

(8) If the bleeding is not checked by a small ball of cotton-wool and pressure, a pellet of cotton wool soaked in collodion or in strong solution of iron perchloride, a fragment of matico-leaf, or the stick of silver nitrate thrust within the bite will help to arrest it. If all these measures fail, a needle passed through the bite and a silk thread wound round it in the shape of a figure of 8 is sure to stop it.

(9) As the marks of leech-bites are indelible such parts only should be selected for application, as will not be exposed to view. As for instance, in otitis on the mastoid process, and in ophthalmia high up on the temple.

(10) Leeches should be applied with great caution to the old, the enfeebled and to children. In the case of children they should not be applied at night, lest a dangerous hæmorrhage should pass unnoticed in the darkness.

(11) It must be remembered that the smoke of tobacco or any other strong smell in a room often prevents the leech from biting.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

HOMATROPINÆ HYDROBROMIDUM.

See p. 263.

HYDRARGYRUM.

Mercury. Hg.

Source.—A metal obtained from native mercuric sulphide (cinnabar).

Characters.—Silver-white, liquid, easily divisibie into globules. Volatilises at 662°F. and solidifies at 39°F. *Impurities.*—Lead, tin and other metals.

Official Preparations.

1. **Emplastrum Hydrargyri.**—1 in 3. A bluish solid.

2. **Emplastrum Ammoniaci cum Hydrargyro.**—1 in 5. A dirty-blue solid. Stimulant and resolvent in glandular enlargements, buboes, nodes, lupus and sycosis, &c.

3. **Hydrargyrum cum Creta.** *Syn.—Grey Powder.*—1 in 3. A greyish blue powder. *Impurity.*—Mercuric oxide. **B.P. Dose.**—1 to 5 grs.; ½ to ½ gr. for a child 1 year old. Alterative. Useful in children's diarrhœa with pale offensive, green, muddy-coloured or curdy stools, dyspepsia, jaundice, tonsillitis, &c., in ⅓ to ½ gr. 3 or 4 times a day.

4. **Linimentum Hydrargyri.**—1 oint. in 3, or 1 of Hg. in 6. A stimulating absorbent liniment for chronic enlargement of joints. Produces salivation when applied to the arm-pit on lint. More irritating than plaster or ointment.

5. **Pilula Hydrargyri.** *Syn. B.P.—Blue Pill.*—1 in 3. Purgative. In biliousness or for general action of mercury with opium.
B.P. Dose—4 to 8 grs.

6. **Unguentum Hydrargyri.** *Syn.—Blue Ointment.*—1 in 2. For general action by absorption.

7. **Unguentum Hydrargyri Compositum.** *Syn.—Scott's Ointment or Dressing.*—1 Hg. in 5. Resolvent. In chronic indurated joints, infiltrations, and glandular enlargements.

Non-Official Preparations.

1. **Lanolinum Hydrargyri.**—Mercury 100, Lanoline 200, Mercurial ointment 5, Mutton Suet 50. More rapidly absorbed. In syphilis as an inunction.

2. **Oleum Cinereum.** *Syn.—Grey Oil.*—Mercury 39, Mercurial ointment 2, Vaseline 59. *Dose.*—1 to 2 ms. hypodermically in syphilis. Not safe. May cause cellulitis.

3. **Mercury Plaster Mull** (Unna).—Mercury 1 gr. to each square inch.

4. **Suppositoria Hydrargyri.**—5 grs. of oint. in each. To produce general action without interfering with digestion.

5. **Hyrgol.** *Syn.—Hydrargyrum Colloidale.*—Soluble in water; said to contain nearly 20 p.c. of mercury. A 10 p.c. ointment useful in epididymitis.

6. **Mercuriol.** *Syn.—Mercuramalgam.*—An amalgam of mercury,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

aluminum and magnesium. An amorphous powder, containing 40 p.c. of mercury, which volatilises under the influence of heat and moisture. Carried as a sachet, next the skin, in syphilitic affections.

7. **Mercurol.**—A combination of mercury and nuclein, used as an injection (½ to 2 p.c.) in gonorrhœa.

8. **Unguentum Hydrargyri Mitius. B P.C.** *Syn.*—*Blue Unction.*—Ung. Hydrarg. 1, Lard 2. Mix. Useful for destroying Pediculus pubis.

HYDRARGYRI IODIDUM RUBRUM.

Mercuric Iodide. HgI_2.

Syn. B.P.—Biniodide of Mercury.

Source and Characters.—A crystalline vermilion powder, obtained by the interaction of mercuric chloride with potassium iodide.

Solubility.—Insoluble in water, but freely in solution of potassium iodide and ether.

Action.—Antiseptic, irritant, vesicant. Alterative, deobstruent and irritant poison in large doses.

B.P. Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ gr. in **pilules**, prepared with milk-sugar and glucose; or in mixtures of Pot. iodide.

Official Preparations.

1. **Liquor Arsenii et Hydrargyri Iodidi.**—*Donovan's Solution.* See page 172.

2. **Unguentum Hydrargyri Iodidi Rubri.**—1 in 25. Rubefacient absorbent. Syphilitic warts, nodes, lupus and bronchocele.

Non-Official Preparations.

1. **Injectio Hydrarg. Iod. Rub. Hypodermica.**—Mercuric iodide 1 gr., sodium iodide *q. s.*, water to 64 ms. *Dose.*—2 to 6 ms.

2. **Injectio Hyd. Iodidi** (pro Vagina).—1 in 10,000. Mercuric chloride 8 grs., Pot. Iodide 5 grs., water to 1 oz. 1 dr. to 1 pint of water.

3. **Hydrarg. et Potassii Iodidi.**—Yellow acicular crystals. *Dose.*—$\frac{1}{16}$ to ¼ gr.

4. **Hydrargyri Iodidum Viride B.P. 1867.**—A dull green powder decomposing into Hg. and mercuric iodide upon exposure to light. **Action.**—Same as mercuric iodide, but more irritant. *Dose.*—⅛ to 1 gr.

5. **Hydriodol.** *Syn.*—*Cypridol.*—Contains 1 p.c. of Iodide in sterilised oil. For hypodermic injection. *Dose.*—3 to 6 ms.

HYDRARGYRI OLEAS. Mercuric Oleate.

Source and Characters.—A light greyish unctuous substance obtained by the interaction of mercuric chloride and sodium oleate.

Action.—The same as liniment or ointment, but absorbed more rapidly. Kills pediculi.

Official Preparation.

1. **Unguentum Hydrargyri Oleatis.**—1 in 2.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

HYDRARGYRI OXIDUM FLAVUM.

Yellow Mercuric Oxide. HgO.

Source and Characters.—A yellow non-crystalline powder obtained by the interaction of mercuric chloride and sodium hydroxide. $HgCl_2 + 2NaHO = HgO + 2NaCl + H_2O$. Insoluble in water.

Official Preparation.

1. **Unguentum Hydrargyri Oxidi Flavi.**—1 in 50. **Action.**—Parasiticide and alterative. Valuable in tinea tarsi, corneal ulcer, obstinate conjunctivitis, and the eczema of the eye-lids. It is a substitute for **Golden Ointment.**

HYDRARGYRI OXIDUM RUBRUM.

Red Mercuric Oxide. HgO.

Source and Characters.—An orange-red powder obtained by heating mercurous nitrate until acid vapours cease to be evolved. Insoluble in water.

Official Preparations.

1. **Unguentum Hydrargyri Oxidum Rubri.** *Syn. B.P.—Red Precipitate Ointment.*—1 in 40. Locally stimulant and absorbent. Diluted in ophthalmia like yellow mercuric ointment. In syphilitic sores and skin diseases.

Non-Official Preparations.

1. **Hydrargyri Cyanidum.**—White or colourless crystals, obtained by boiling red mercuric oxide with Prussian blue. A powerful antiseptic. As a lotion to syphilitic sores, and in pill $\frac{1}{10}$ to $\frac{1}{12}$ gr. In diphtheria $\frac{1}{100}$ gr. with Tr. aconite 1 m. frequently. *Dose.*—$\frac{1}{200}$ to $\frac{1}{4}$ gr.

2. **Mercuro-Zinc Cyanide.**—A white powder recommended by Lord Lister as an unirritating antiseptic to make gauze, and ointment for eczema.

HYDRARGYRI PERCHLORIDUM.

Mercuric Chloride. $HgCl_2$.

Syn. B P.—Bichloride of Mercury, Corrosive Sublimate, Perchloride of Mercury.

Source.—A salt obtained as a sublimate by heating a mixture of mercuric sulphate, sodium chloride, and a little black oxide of manganese, $HgSO_4 + 2NaCl + MnO_2 = HgCl_2 + Na_2SO_4 + MnO_2$.

Characters.—Heavy colourless masses of prismatic crystals. *Solubility.*—1 in 16 of cold, 1 in 2 of boiling water; 1 in 3 of alcohol (90 p.c.), 1 in 4 of ether; 1 in 2 of cold glycerin on trituration.

Impurities.—Fixed salts, not volatilising.

Incompatibles.—Alkalis and their carbonates, potassium iodide, lime water, tartar emetic, silver nitrate, albumen, lead acetate, soaps, decoction of bark.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

N.B.—Perchloride of mercury decomposes even in distilled water, calomel being deposited. If organic substances are present, the change takes place more rapidly. Ordinary well water is therefore not a good vehicle with which to prepare solutions of the perchloride. The addition however of some free acid—such as ordinary vinegar (1 in 125) or tartaric acid—will prevent this decomposition.

Action.—Antiseptic, disinfectant, parasiticide, alterative, antisyphilitic. A powerfully irritant poison. **B.P. Dose.**—$\frac{1}{12}$ to $\frac{1}{6}$ gr. in solution. Hypodermically with sodium chloride.

Official Prepapations.

1. **Liquor Hydrargyri Perchloridi.**—½ gr in 1 oz. A colourless solution, each drachm containing $\frac{1}{16}$ gr. **B.P. Dose.**—½ to 1 dr. diluted.
2. **Lotio Hydrargyri Flava.** *Syn. B.P.—Yellow wash.*—Colour due to yellow oxide. Resembles yellow oxide ointment in action.

Non-Official Preparations.

1. **Corrosive Sublimate Pastils or Discs.**—Containing 8¾ grs. of mercuric chloride with the same weight of sodium chloride, coloured violet. 1 disc in 1 pint of water is equal to 1 in 1000.
2. **Sublimate Wood-Wool or Wool.**—½ p.c. of Corrosive Sublimate.
3. **Sal Alembroth.** *Syn.—Ammonio Mercuric Chloride.*—Prepared by interaction of ammonium chloride with mercuric chloride. Soluble 2 in 1 of water. **Alembroth Gauze.**—1 p.c. Damped with carbolic lotion before use as a dressing. **Alembroth Wool.**—2 p.c. Tinted blue. **Hypodermic Injection.**—½ gr. in water, as an intra-muscular injection into buttocks for syphilis once or twice a week.
4. **Hydrargyri Carbolas.**—Colourless crystals or white powder. In secondary syphilis especially syphilitic psoriasis and tubercular or macular eruptions. *Dose.*—⅛ to ½ gr. in *Pill*, 3 or 4 times a day.
5. **Glutinopeptonate of Corrosive Sublimate.**—Soluble silky scales. 4 grammes in 100 cubic centimetres of water make a 1 p.c. mercurial solution. One Pravaz syringeful every day hypodermically in syphilis. Abscesses do not follow and no chance of relapse after 4 weeks.

HYDRARGYRI SUBCHLORIDUM.

Mercurous Chloride. Hg_2Cl_2.

Syn. B.P.—Calomel, Hydrargyri Chloridum, Subchloride of Mercury.

Source.—A salt obtained as a sublimate when a mixture of mercurous sulphate and sodium chloride is heated. $Hg_2SO_4 + 2NaCl = Hg_2Cl_2 + Na_2SO_4$.

Characters.—A dull white heavy nearly tasteless powder.

Solubility.—Insoluble in water, alcohol (90 p.c.) or ether. Volatilised by heat. *Impurities.*—Mercuric chloride soluble in water, and other chlorides.

Test for impurity.—Take a clean knife, put on it a drop of water and add a few grains of the suspected calomel. After the lapse of a minute

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

wash the blade, when there should be no dark stain. If a black spot of magnetic oxide forms, that shows the presence of perchloride.

Action.—Alterative, purgative and diuretic.

B.P. Dose.—½ to 5 grs. ; 1 gr. for a child 1 year old.

Official Preparations.

1. **Lotio Hydrargyri Nigra.** *Syn. B. P.—Black Wash.*—3 grs. to 1 oz. The black precipitate is Hg_2O. A stimulating alterative lotion to syphilitic sores.

2. **Pilula Hydrargyri Subchloridi Composita.** *Syn.—Compound Calomel Pill. Plummer's Pill.*—1 in 4½. An orange coloured mass. **B.P. Dose.**—4 to 8 grs. Alterative and feeble cathartic.

3. **Unguentum Hydrargyri Subchloridi.** *Syn.—Calomel Ointment.*—1 in 10. Rarely used. Relieves the itching of eczematous eruptions about the anus and genitals. Salivation rare.

Non-Official Preparations.

1. **Calomel Cream.**—Calomel 10 g.s., Vaseline to 1 oz.

2. **Pulvis Basilicus.**—Calomel 3, Scammony 3, Pot. Tartras Acid. 3, Jalap 1, Ginger 1, Pulv. Antimonial 1.

Dose.—For a child of 2 years, 4 grs. : of 6 years and upwards, 8 grs.

HYDRARGYRUM AMMONIATUM.

Ammoniated Mercury. NH_2HgCl.

Syn. B.P.—Ammonio Chloride of Mercury, Mercuric Ammonium Chloride, White Precipitate, White powder. Insecticide. Not used internally.

Official Preparation.

1. **Unguentum Hydrargyri Ammoniati.** *Syn.—White Precipitate Ointment.*—1 in 10. Stimulant and alterative in chronic parasitic skin diseases as scabies, ringworm, impetigo, &c., and destroys pediculi.

LIQUOR HYDRARGYRI NITRATIS ACIDUS.

Acid Solution of Mercuric Nitrate.

Source and Characters.—A colourless solution of mercury in nitric acid and water. *Impurity.*—Mercurous nitrate. **Action.**—Antiseptic, caustic. To destroy syphilitic warts, tubercles, ulcers, cancerous growths, and lupus ; care being taken that surrounding healthy tissues are not touched. **Gargle.**—1 to 2 ms. in 1 oz. of water. **Gonorrhœal injection.**—1 m. in 2 ozs. of water.

Official Preparations.

1. **Unguentum Hydrargyri Nitratis.** *Syn.—Citrine Ointment.*—1 in 16½. Pale lemon colour. Great care and skill are necessary in its preparation. **Dispensing hints.**—Diluted with lard becomes leaden coloured, but less with spermaceti and least with paraffin ointments. **Action.**—Stimulant, alterative. In *tinea tarsi* with 7 parts of vaseline.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Aborts whitlows and boils. **Incompatibles.**—Camphor, essential oils, lard &c.

2. **Unguentum Hydrargyri Nitratis Dilutum.**—1 in 5. A stimulant and alterative application to scaly eczema. Diluted with glycerin and brushed inside the nostrils cures inveterate ozœna.

Non-Official Preparation.

1. **Unguentum Metallorum.**—Is a mixture of oxide of zinc, diluted with nitrate of mercury and acetate of lead ointments in equal parts. Largely used in chronic eczema.

Additional Non-Official Preparations of Mercury.

1. **Hydrargyri Benzoas.**—A white crystalline powder. For hypodermic injection in solution which should be prepared fresh. Hydrarg. Benzoas 5 grs., Sodium Chloride 1½ grs., Water 10 drs.; one pravaz syringeful daily.

2. **Mercuric Ethylene-diamine Sulphate.** *Syn.*—*Sublamin.*—Contains 43 p. c. of mercury. Used as a lotion in the strength of 1 in 1000, an admirable disinfectant, but *very poisonous.*

3. **Hydrargyri Formamidum.**—1 per cent solution for hypodermic injection from ½ to 1 pravaz syringeful. Not so successful.

4. **Hydrargyri Gallas.**—Dark-green insoluble powder, being more stable and rapidly absorbed.

Dose.—½ to 1 gr. in primary and secondary syphilis.

5. **Hydrargyri Lactas.**—Very soluble and non irritant. *Dose.*—¼ gr in 15 ms. of water. (hypodermically).

6. **Hydrargyri Napthol-acetas.**—An insoluble white powder. *Dose.*—½ to 1 gr. In syphilis as intra-muscular injection. Not so successful.

7. **Hydrargyri Salicylas.**—A white powder, slightly soluble in water. Powerful antiseptic and antisyphilitic. For syphilitic sores, as ointment or dusting powder. Corrosive sublimate 1, Sod. Salicylas 2, Water 1,000, form a good lotion for external application.

8. **Hydrargyri Silico-Fluoridum.**—A colourless soluble salt used as a substitute for sublimate, but less irritating and less poisonous.

9. **Hydrargyri Sozoiodol.**—A pale yellow powder, soluble in solution of sodium chloride. Hypodermically in 1 gr. doses. Sprinkled over chancers and syphilitic sores (1 in 15).

10. **Hydrargyri Succinimidum.**—A white silky powder soluble in water. Highly recommended for hypodermic injection. A pravaz syringeful of 2 p. c. solution into the buttock is the usual dose.

11. **Hydrargyri et Sodii Disulphocarbolas.** *Syn.*—*Hermophenyl.*—Contains 40 p. c. of mercury. Antisyphilitic. *Dose.*—⅛ gr. in 1 dr. of water. (hypodermically).

12. **Hydrargyri Tannas.**—A green tasteless powder decomposed by weak alkalis setting free globules of mercury. Rapidly absorbed from the intestines without the disagreeable symptoms of mercurials, and producing best results in syphilis. *Dose.*—1 to 2 grs. in pill.

13. **Hydrargyri Thymolacetas.**—A white crystalline insoluble powder, produced by mixing acetate of mercury and thymol. Internally in ¼ gr. and subcutaneously with vaseline oil into the muscles. Injections are stated to be free from the danger of abscess.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY OF MERCURY AND ITS SALTS.

Externally.—Metallic mercury and its salts are **absorbed** by the unbroken skin and may be administered either as an inunction or by fumigation. They enter easily through the hair and sebaceous follicles as an oxide or a chloride in combination with the fatty acids of the sebaceous glands. But on the denuded skin and mucous membranes, they produce certain **definite** actions which are given below :—(1) All mercurials are **antiseptic** and **disinfectant**; more especially the corrosive sublimate, which, in dilutions of 1 in 500,000, prevents the growth of, and of 1 in 25,000 destroys, ordinary bacilli. The German Plague Commission at Bombay have proved that a 1 p. c. solution of sublimate kills the plague bacillus immediately. Moreover many of them, such as the ammoniate, nitrate, perchloride, oleate and oxide destroy animal parasites, hence they are **parasiticides**. (2) Weak solutions of corrosive sublimate ($\frac{1}{2}$ to $\frac{1}{4}$ gr. in 1 oz.), mercurous and many mercuric ointments are **antiphlogistic, astringent, stimulant** and **resolvent**. (3) Stronger solutions, as of the acid nitrate and perchloride, cause **inflammation**; and the concentrated ones **sloughing**.

Internally.—After absorption all mercurial salts have practically the same action, but their local effects vary much in the same way as mentioned in the last paragraph.

Gastro-intestinal tract.—Mercurial salts affect the mouth, gums and salivary glands causing **salivation** and **stomatitis**. This is not the result of direct local action but takes place during the process of excretion by the salivary glands. In the **stomach** they are converted into a complex albuminate containing albumen, sodium chloride and chlorine, which is insoluble at first, but becomes soluble in the excess of albumen or sodium chloride that exists in the stomach, and is then easily absorbed. In the duodenum and upper part of the small intestine, metallic mercury, such as grey powder, blue pill, and calomel **increase** the **glandular secretions** and **peristalsis**. The intestinal contents are, as the result of this action, hurried on so rapidly that the bile is not reabsorbed as happens normally, consequently the stools are **dark-green** (calomel motions). Hence mercurial salts are **purgatives**. The purgative action is greatly helped by salines. If the doses are insufficient, or sometimes from idiosyncracy, mercury may be absorbed producing constitutional symptoms, but it is afterwards re-excreted into the bowel as a sulphide. Mercurials arrest **putrefactive changes** in the duodenum and intestine, thereby checking flatulence. As the result of the arrest of putrefactive changes, biliverdin passes unchanged, and no Indol is formed. Hence calomel stools are not only grass-green but they are singularly free from putrefactive odour.

Liver.—It is a mistake to say that mercurials increase the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

amount of bile formed by the liver, though the perchloride may possibly do so to some extent. Metallic mercury and calomel increase the evacuation of bile by checking its re-absorption in the way already explained, and at the same time they stimulate the gall-bladder and bile-ducts. Hence they are reckoned as **indirect cholagogues** (see p. 131).

Blood.—The soluble complex mercurial albuminate freely enters the blood from the stomach and the intestines; and on entering, it is decomposed by oxygen and albumen, forming an **oxyalbuminate**. In *minute and continued doses* mercuric chloride not only increases the **number of red corpuscles**, but increases their **hæmoglobin**, and thus adds a little to the body weight In this sense it may be considered as a **tonic**. In *large doses* it causes **anæmia**; but how far these actions are due to the improvement or impairment of digestion, or to its action on the blood itself, is not yet known. It arrests the movements of the leucocytes.

Kidneys.—Calomel or sometimes blue pill, in 3 to 5 grs. doses, occasionally acts as a **diuretic** in cardiac dropsy; but it must be used with caution if the kidneys are diseased The combination with squill and digitalis increases their diuretic action.

Elimination.—Mercury is slowly eliminated by the urine, bile, milk, sweat, saliva; this elimination is especially slow if the kidneys are diseased. It is excreted with the fæces as a sulphide. It accumulates in the body, and can be detected in every organ, but largely in the liver, and the cancellous tissue of the bones. During its excretion by the saliva it affects the salivary glands, largely increasing the **salivary secretion**, by acting either on their secreting cells or the terminal ends of the nerves in them. (See page 122).

Specific action.—Mercury is a specific for syphilis, especially in the primary and secondary stages. This is probably due to its acting as a parasiticide for *Spirochæta Pallida*, the organism which is now believed to be the cause of this disease.

Toleration.—Age, sex and idiosyncracy greatly modify the action of mercurials. Children as a rule bear mercury better than adults, and males better than females. Patients suffering from granular kidney, scrofula, scurvy and malarial cachexia are peculiarly susceptible to this drug. Some are so peculiarly susceptible to this drug, that very small doses may cause salivation. The writer treated a patient, in whom 3 grs. of calomel with compound colocynth extract, produced severe mercurialism although he was purged by the pill. Pregnancy is no bar to the administration of mercury.

Acute toxic action.—Acute poisoning is not common. Mercurials, especially the mercuric salts produce severe **gastro-enteritis**, with vomiting, pain, purging, and bloody stools, collapse and even death.

Antidotes.—Emetics, stomach pump cautiously, and then only at

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the very commencement. Demulcent drinks, milk, albumen, oil, gluten freely. The best plan is to first give demulcent drinks and then wash out the stomach. Morphine and alcohol subcutaneously.

Chronic toxic action. Hydrargyrism or Mercurialism.—This is now rare, but occurs occasionally either as the result of accident or malpraxis. The first indications of mercurial poisoning are fœtor of the breath, and soreness of the gums (the medicinal administration of mercury should not go further), soon followed by a disagreeable metallic taste; swollen, red, spongy gums, bleeding on the least touch; and increased salivary discharge. These symptoms increase, the tongue becomes furred and swells, the tonsils and pharyngeal glands enlarge, there is swelling and tenderness of the eyelids and submaxillary glands. the teeth get loosened, the gums recede and become ulcerated, the saliva gets thick and viscid, and pours out of the mouth, fever and depression set in, &c. If the dose is large and long continued these symptoms are aggravated, and end in the falling out of teeth, ulceration and abscesses of the mouth, necrosis of the jaw-bones, great prostration, anæmia, emaciation, repeated hæmorrhages, and death.

Protracted exposure to a moderate degree of mercurial vapour produces a different train of symptoms generally known as **mercurial tremor.** Besides the cachectic symptoms there are muscular tremors, first beginning at the face, then invading the arms and the legs, extreme weakness of the affected muscles (mercurial palsy); mental weakness, and functional disturbance of special senses. These tremors differ from those of paralysis agitans in that they are increased by attempts at voluntary movement, i.e.—they are "intention tremors."

Metallic mercury vaporises even at the ordinary temperature and may produce poisonous effects, even though the evaporating surface be small, if emanations from it continue for any length of time.

Several cases are on record in which mercurial cachexia has resulted from vaporisation of the mercury with which the backs of mirrors are coated. The student should bear this fact in mind for future guidance.

THERAPEUTICS OF MERCURY AND ITS SALTS.

Externally.—**As an antiseptic,** cyanide and perchloride of mercury are used, but the solution of the latter is largely employed for **disinfecting** purposes, as well as in **surgical** and **obstetric** practice. A lotion (1 in 1,000) is strong enough for washing infected rooms, furniture, articles, linen, the Surgeons' and Gynæcologists' hands, the parts to be operated upon, and for moistening dressings, towels, wool, &c. A lotion (1 in 10,000) may be ordinarily used for washing wounds and ulcers, but the former strength can be advantageously employed if they are foul or of syphilitic origin. In obstetric practice, a solution of 1 in 5,000 is the strength ordinarily used for irrigation of the vagina and uterus, but its strength requires to be diminished to 1 in 10,000, if used continuously for any length of time.

Professor Lockwood prefers the lotion of the soluble iodide as this salt does not combine with albumen and there is therefore less risk of absorption. Moreover it does not give the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

wound that "pickled" appearance which results from the use of the perchloride.

As a parasiticide.—Citrine and white precipitate ointments and perchloride lotion (1 to 2 grs. in 1 oz. of water) are employed to destroy the fungus of **tinea**, such as of ringworm, mentagra, and **favus**; and **animal** parasites, such as the various kinds of lice and their nits and the acarus scabœi. The red oxide or citrine ointment is very effective in **tinea ciliaris**. The eyelashes should be cut short and the scabs removed before the application of the ointment, which may be diluted if necessary. The oleate is a useful application in **pityriasis versicolor.**

As a remedy for Pruritus.—Blue ointment, calomel ointment (1 dr. to 1 oz.), black wash and yellow wash relieve the distressing itching of many **skin diseases**, such as, urticaria, prurigo, pruritus ani, pruritus pudendi, psoriasis, lichen, pityriasis of the scalp and eczema. If applied with care and not to a large area, there is very little danger of salivation.

As a stimulant and promoter of absorption.—The plaster, the liniment and the various ointments, such as, oleate, red precipitate, Scott's and red iodide are used for dispersing **glandular enlargements**, as buboes; and for promoting the absorption of inflammatory products, as in **chronic joint disease, chronic peritonitis** and **periostitis.** Ung. Hyd. Iod. Rubri is a capital application for **goitre**, especially if the patient be made to sit in the sun or before a fire immediately after the application has been made. It is also said to absorb **bony tumours** and out-growths of horses and cattle. Calomel dusted into the eye is a valuable remedy for phlyctenular ophthalmia.

As an antiphlogistic—Diluted citrine ointment if applied over **whitlows** and **boils** and then covered with plaster rapidly causes them to abort. Mr. Marshall strongly recommends oleatum hydrargyri (liquid) 5 p. c. with morphine (1 in 60) in **synovitis, articular inflammation, mammary** and other glandular inflammations, **tonsillitis, epididymitis, threatened suppuration** or abscess, &c. Mercurial ointment is useful in **onychia** and **paronychia.** A ten minutes' application followed by a poultice every hour cuts short the inflammation. Scott's dressing applied to **indurated** and **inflamed carbuncles** softens and subdues inflammation.

As an irritant and caustic.—Mercuric nitrate lotion is employed to destroy **warts, condylomata, lupus** and other small excrescences, but much of this caustic action is no doubt due to the free nitric acid it contains.

As a specific.—Mercurial ointments, black wash and yellow wash are always prescribed for dressings over **chancres** and other **syphilitic sores.** Blackwash is an unirritating application, when the sores are kept wet with a bit of lint soaked in it. Nothing is so good as to wash all suspicious sores with a per-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

chloride lotion (1 in 500). According to Ringer a cyanide of mercury lotion (5 to 15 grs. in water 1 oz.) is a good local application to syphilitic sores, such as those of the penis, throat, tongue, anus, &c. Besides their use in syphilitic sores, they are of great service in all varieties of skin diseases, originating from syphilis. Local use must be combined with internal administration.

Finely powdered calomel is also applied locally in syphilitic and other affections of the eye (phlyctenular ophthalmia). When applied in this way it is important to bear in mind that potassium iodide must not be simultaneously administered internally, otherwise it will appear in the lachrymal secretion and then, mixing with the calomel, will produce an iodide of mercury and violent inflammation of the eye will be the result.

Internally. **Gastro-intestinal tract.**—Local **syphilitic sores** in the mouth soon heal under the use of the perchloride mouth-wash (Perchloride 4 grs., Acid Hydroch. Dil 10 ms. in water 10 ozs.). **Vomiting** in infants whether occurring immediately after feeding or at other times is stopped by grey powder in $\frac{1}{12}$ gr. or $\frac{1}{8}$ gr. given every 2 or 3 hours (Ringer). **Infantile diarrhœa** whether acute, subacute or chronic, with clay-coloured, offensive, or dark-green, or slimy, or curdy stools, soon yields to small doses of calomel or grey powder. In **infantile cholera**, the vomiting and purging are soon arrested by an hourly dose of grey powder ($\frac{1}{8}$ gr). **Cholera** too in adults has been checked by calomel given in 2 to 3 gr. doses alone, or in combination with bismuth and camphor. Large doses (20 to 30 grs.) of calomel are utterly useless in this disease. In that form of **quinsy** or **scarlatina**, in which the difficulty in breathing is insuperable, Ringer recommends $\frac{1}{3}$ gr. of grey powder every hour. Cases of obstinate **hiccough** have been checked by small doses of calomel. Blue pill or calomel is given as a **purgative**, but it should never be prescribed to habitual opium eaters, or to a patient under opium treatment, for fear of absorption and constitutional symptoms. In every case, it is a good plan to follow the mercurial by a saline aperient. A mercurial preparation should not be given nightly as a purgative, for it not only loses its effect, but there is a chance of accumulation. Sometimes, it produces severe gastro-enteritis. Perchloride of mercury $\frac{1}{100}$ gr. given hourly or every two hours, has been recommended by Ringer in **chronic diarrhœa** of adults marked by pale watery stools, and in acute and chronic **dysentery**. A full dose as large as can be borne has sometimes produced wonderful results in **ulcerative enteritis**. Calomel or grey powder in small doses or as a purgative clears the thickly coated creamy tongue of many acute diseases.

In **biliousness** or **hepatic derangement** due perhaps to free living, a dose of blue pill or calomel at night, followed by a dose of compound senna mixture, or Seidlitz powder or compound liquorice powder next morning, produces excellent results.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Inflammatory diseases.—Few now prescribe mercury in **acute inflammatory diseases**, except in **iritis**, but there are many who yet use it in **meningitis** and inflammation of other serous membranes, whilst American writers are now recommending its use in **endocarditis.**

Dropsy and ascites.—Calomel given several times a day acts as a diuretic in **cardiac dropsy**. Its efficacy is greatly increased if combined with digitalis and squill, as in Guy's pill (see page 384) It is said also to benefit, though temporarily, **ascites** due to **cirrhosis** of the **liver** It should never be given in renal dropsy.

Syphilis.—Mercury is an antidote for the syphilitic virus. Its efficacy is most marked in **primary** and **secondary syphilis**, but opinions differ as to its efficacy in tertiary syphilis In **soft chancre** it is positively injurious. In true **hard** or **indurated chancre**, mercurials should not only be employed locally, but given internally until the thickening and induration pass away. Mercurialism should never be induced. Any non-irritant preparation, such as calomel, Plummer's pill, blue pill or grey powder should be steadily continued till the gums are affected, or symptoms of salivation threaten, when its use should be suspended for a while. Calomel 1 gr. with opium ¼ gr., Plummer's pill 5 grs., or grey powder 2 grs., are generally used for this purpose. Besides giving it by the mouth, the constitution can be soon brought under the influence of mercury by other methods, which are detailed below. Though mercury is not recommended in **tertiary syphilis**, the writer often uses it with potassium iodide with decidedly good results. According to Keyes an unremitting use of mercurials in small doses for two years can eradicate the poison from the constitution. Green iodide is still prescribed, but its instability is a serious drawback. Grey powder is an excellent remedy for **congenital syphilis.**, The routine treatment for a child six months old is half a grain three times a day for 3 days, then once at night, so long as the child thrives.

Modes of administration.—Mercury can be introduced into the system by the following methods:—

1. **By the mouth.**—By this route we administer blue pill, calomel, grey powder, corrosive sublimate, &c, for absorption by the mucous membranes of the stomach and intestines.
2. **By the rectum.**—Mercurial suppository is used for local action.
3. **Inhalation.**—This method is rarely resorted to.
4. **Fumigation.**—Volatilised calomel is administered by this method (see page 70). Simultaneous diaphoresis induced either by steam or jaborandi given internally, helps its action. Fumigation sometimes causes great weakness and prostration, but on the whole, it is considered to be the best, for it does not disorder the functions of the stomach and bowels. Many rebellious cases of syphilis, where the administration by the mouth has failed, yield to fumigation or inunction. Fumigation can be used for either local or general action.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

5. **Inunction.**—By rubbing blue ointment, liniment or oleate of mercury into the skin, mercury can be rapidly introduced into the blood. The inner surface of the thigh, or the axilla is a suitable spot for inunction. This method is especially useful for the treatment of young children. 20 to 60 grs. of blue ointment may be rubbed in nightly or every other night. The site of rubbing should be varied for fear of local irritation. The German ointment (1 of Hg. in 3) is no doubt superior to the B.P. preparation, but much of the success of the treatment of syphilitic cases at Aix is due probably to the superior climate of the place, and the regulated life of the patients.

6. **Endermically.**—Calomel is dusted over raw blistered surfaces or ulcers or mercurial lotion applied. Mercury may thus be absorbed.

7. **Hypodermically.**—This method is much practised on the continent. Several preparations are used for this purpose. Mercuric chloride $\frac{1}{8}$ gr. with a trace of sodium chloride in 10 ms. of distilled water is generally used for a single dose. Grey oil produces local irritation. Several non-official preparations are used hypodermically. Intra-muscular injection preferably at the outer part of the gluteal region, is the rule. $\frac{1}{3}$ gr. of morphine should be injected before the mercurial injection, to prevent pain. By this method a patient is soon brought under the influence of mercury without affecting digestion.

8. **Intravenous injection.**—Lane injected successfully 20 ms. of a 1 p. c. solution of cyanide of mercury into the most prominent vein below the elbow.

9. **Baths.**—Mercuric chloride is used for a bath (see page 70).

Caution.—Unless appetite and digestion are good, the mercury should not be given by the mouth. Weak, anæmic, and scrofulous subjects and those suffering from kidney diseases cannot bear mercurials. For fear of absorption it should not be employed over a large area. Concentrated solutions should not be used as injections into the vagina and uterus.

The following instructions should be given to a patient when he is to be placed upon a prolonged course of mercury :—

(1) Avoid fruits, green vegetables, coffee and aperients.
(2) Lessen your stimulants.
(3) Stop smoking altogether.
(4) Dress warmly and beware of chills.

HYDRASTIS RHIZOMA.

Hydrastis. N.O. *Ranunculaceæ.*

Syn.—Golden Seal.

Habitat.—United States and Canada.

Source.—The dried rhizome and roots of *Hydrastis canadensis.*

Characters.—Rhizome $\frac{1}{2}$ to $1\frac{1}{2}$ in. long. $\frac{1}{8}$ to $\frac{1}{4}$ in., thick, tortuous, simple or branched, yellowish-brown becoming darker by age. Cup-shaped scars of decayed branches on the upper surface. Rootlets from the lower surface and sides. Fracture resinous, brownish-yellow. Odour characteristic. Taste bitter.

Incompatibles.—Tannic acid, hydrochloric acid, alkalis.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Composition.—It contains alkaloids, (1) *Berberine*, (2) *Hydrastine*, (3) *Canadine*.

Action.—Stomachic, tonic and hæmostatic.

Official Preparations.

1. **Extractum Hydrastis Liquidum.**—1 in 1. **B.P. Dose.**—5 to 15 ms.
2. **Tinctura Hydrastis.**—1 in 10. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Extractum Hydrastis.**—The liquid extract evaporated. *Dose.*—2 to 5 grs.
2. **Hydrastin.**—Contains Hydrastine and Berberine Hydrochloride. An eclectic remedy. *Dose.*—2 to 6 grs.
3. **Hydrastina.**—A white crystalline alkaloid resembling strychnine in appearance. Acts like quinine, though milder. *Dose.*—¼ to ½ gr. in pill, or hypodermically.
4. **Hydrastinæ Hydrochloridum.**—A faintly yellow crystalline salt, soluble in water. *Dose.*—½ to 1 gr.
5. **Hydrastinine.**—An oxidation product of natural *Hydrastine* alkaloid.
6. **Hydrastininæ Hydrochloridum.**—A pale yellow crystalline powder, soluble in water. Strengthens weak labour pains and checks uterine hæmorrhage. *Dose.*—½ to 1½ grs.; hypodermically in 10 p. c. solution.
7. **Hydrastinæ Tartras Acidus.**—Fine white needles, specially soluble in water. *Dose.*—½ to 1 gr.

Pharmacology.

Externally.—Hydrastis acts as a **stimulant** and **antiseptic** to ulcerated surfaces.

Internally—Hydrastis being bitter, promotes appetite and digestion, and stimulates gastric and intestinal secretion and peristalsis. It is therefore a **stomachic, tonic** and **laxative.** It is said to possess an alterative or tonic action on the mucous surface. It slightly increases the secretion of bile and urine. It contracts the unstriped muscular fibres of the arteries and those of the uterus, hence it is **hæmostatic** and **ecbolic** though the contractions are not so strong as those produced by ergot. In large doses it is a **cardiac depressant,** and causes fall of blood pressure. Hydrastine produces nervous symptoms similar to those of quinine, and is a mild **febrifuge.** It contracts the tissues of the engorged spleen, and thereby reduces its size. It is said to produce abortion but this is doubtful.

Therapeutics.

Externally.—Hydrastis has been employed as a dressing to chronic unhealthy ulcers, and as an application to eczema (5 to 20 grs. in lard 1 oz.). Hydrastin (1 dr. in mucilage acacia 4 grs.) or the tincture or liquid extract (2 or 4 drs. to 1 pint) makes an

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

efficient lotion for injection in **gonorrhœa** after the acute stage, **gleet, leucorrhœa, cystitis, otorrhœa,** &c. Whitla thinks that a weak infusion of hydrastis is more potent in these cases. Locally it has also been used to arrest **hæmorrhage** from the nares, rectum and uterus, and in **hyperidrosis, acne,** &c. Better results are always obtained by combining external treatment with internal use.

Internally.—Either the liquid extract or the tincture (diluted with an equal part of water) can be used as a gargle in **aphthous stomatitis** and **chronic pharyngitis,** or as an injection for **chronic nasal catarrh, otorrhœa, leucorrhœa,** or **gonorrhœa.** Hydrastine insufflation is a good local application for the latter disease, and an ointment of the strength of 5 to 20 grs. in 1 oz. has proved useful in **eczema.** Hydrastis is one of the most useful remedies we have for chronic **gastric** and **intestinal catarrh,** especially if it be the result of chronic alcoholism. On account of its contractile action on the unstriped muscular fibres of all the arteries and those of the uterus, it has been largely employed in arresting **hæmorrhages,** especially the **uterine.** In short, it may be used in all cases where ergot is indicated. One of the notable effects of hydrastis is, that it not only checks uterine hæmorrhage but soothes uterine and ovarian pain, and it has therefore been employed in **menorrhagia, dysmenorrhœa, metrorrhagia, endometritis** and in the reduction of **uterine tumours.** It does not cause painful contractions like ergot and is therefore sometimes used to strengthen weak labour pains. Some authors claim that it is useful for the same **diseases of the heart** as are benefited by digitalis. As an **antiperiodic** it is far inferior to quinine. It has been found very useful, on several occasions, for checking the nightsweats of phthisis.

HYDROGENII PEROXIDI LIQUOR.

Solution of Hydrogen Peroxide. H_2O_2.

Source.—Prepared by the interaction of water, barium peroxide and a dilute mineral acid, at a temperature below 50°F. Should yield 10 times its volume of oxygen.

Characters.—A colourless, odourless liquid with a slightly acid taste. Renders saliva frothy. It readily decomposes on coming in contact with metallic oxide or heat. *Impurities.*—Barium, mineral matter and less oxygen.

Action.—Powerfully antiseptic, alterative.

B.P. Dose.—½ to 2 drs. in solution.

Non-Official Preparations.

1. **Oxygen water.**—Is drunk as an exhilarating beverage. Used in diabetes, dyspepsia, tetanus, hydrophobia, eclampsia, exophthalmic goitre and pneumonia.

2. **Oxygen gas.**—Compressed oxygen gas is obtainable in cylinders

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

containing 12 to 20 cubic feet. Before inhalation, a rubber tube with an inhaler may be attached, the gas coming out in a gentle stream. Dr. G. Stoker has recently been very successful in the treatment of **indolent ulcers** by exposing them to the vapour of oxygen gas, which has the power of killing off putrefactive bacilli and stimulating the growth of benign microbes. **Oxygen inhalation** is of great use in pneumonia, relieving dyspnœa and reducing pyrexia. It is successfully employed in cardiac and respiratory failure, Bright's disease, angina, asthma, phthisis, &c.

3. **Oxydol.**—Formerly known as "*Eau Maiche*" contains 3 times its volume of available oxygen. Recommended as a wound dressing.

4. **Ozonic Ether.**—A more stable preparation miscible with water. In conjunction with Tr. guaiacum it acts as a test for blood, the colour of which it changes to blue. Recommended in diabetes and whooping cough. *Dose.*—½ to 1 dr.

5. **Pyrozone.**—Is an American speciality containing hydrogen peroxide of several strengths. A 3 p. c. solution is used internally as an antiseptic, and a 25 p. c. solution in ether as a caustic.

6. **"Sanitas" Fluid.**—Contains, as active principles, hydrogen peroxide, thymol, soluble camphor and camphoric acid. It is a non-poisonous antiseptic,

7. **Magnesii Peroxidum.** *Syn.*—*Hopogan.*—A white tasteless powder. Used in anæmia, anorexia, flatulence and pyrosis.

Dose.—½ to 1 teaspoonful.

8. **Zinci Peroxidum.** *Syn.*—*Ektogan.*—A white insoluble powder. Promotes healing of chronic ulcers.

9. **Sodii Peroxidum.** *Syn.*—*Sodium Dioxide.*—A white deliquescent powder, dissolved in water with production of heat and evolution of oxygen. Used as a means of producing oxygen in a patented "*oxygenator*". Also in dentistry. An anhydrous soap, containing 10 to 20 p. c. of the salt, useful in acne.

10. **Alphozone.** $(COOH.CH_2.CH_2.CO)_2O_2$.—A finely crystalline white powder, produced by the synthesis of Succinic acid and Hydrogen Peroxide. Reaction acid. Taste slightly acid and bitter, leaving a metallic after taste. Solubility 1 in 60 of water solution being accompanied by hydrolysis and the production of nascent hydrogen peroxide. A 1 p.c. solution is easily tolerated in the mouth. Useful as a non-toxic germicide.

Dose.—2 grs. in solution.

PHARMACOLOGY.

Externally.—Hydrogen peroxide is a recent introduction into the B.P. Being a powerful oxidising agent, it destroys organised ferments, but has no effect on enzymes. A few drops of a 1½ p.c. solution destroy hydrophobic virus. It causes effervescence when in contact with pus, thus killing bacteria. Hence, it is a powerful **antiseptic and disinfectant.** It bleaches hair and cleanses the skin.

Internally.—The action is antiseptic and alterative like that of iodine.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Therapeutics.

Externally.—Hydrogen peroxide is largely used in dental surgery, and many cosmetics owe their efficacy to its presence. A solution (1 in 8) may be used with benefit in **sores, foul suppurating wounds, chancres** and **fœtid discharges from the ear.**

Internally.—As a spray and pigment it has been used in diphtheria and scarlatinal sore throat. It has been recommended on theoretical grounds in many infective diseases and metabolic disturbances, such as, **scarlatina, fever, diabetes, pertussis** and **uræmia,** but with poor results, and it has been used in the form of vapour to prevent cyanide poisoning in gold mines.

Caution.—Its hypodermic use is dangerous on account of the possibility of "gas-embolism."

HYGROPHILA. Hygrophila.

N. O. *Acanthaceæ* (*Ind. and Col. Addendum*).

Syn. B.P.—Asteracantha. **Syn.. I.V.**—*Kule-khárá*, Beng. *Tálmá-khána*, Hind.

Habitat.—India and Eastern Colonies.

Source.—The dried herb including the root of *Hygrophila spinosa.*

Characters.—Roots with numerous rootlets, tapering; stem 2 to 4 ft. high, quadrangular, branches and leaves opposite. Leaves entire, 6 at each node; outer two about 4 to 5 in. long and ½ in. broad; 4 inner about 1½ in. long. In the axil of each leaf, is a yellowish spine about 1 in. long. Leaves and stems are furnished with hispid, spreading, scattered white hairs. Flowers bright purplish-blue, four pairs at each node. Calix four sepals, one broader than the others. Corolla glabrous, two lipped with didynamous stamens. Ripened ovary with 4 to 8 seeds.

Composition.—*Colesterol* an alkaloid. *Inorganic salts, fixed oil* and *mucilage.*

Action.—Demulcent and diuretic.

Official Preparation.

1. **Decoctum Hygrophilæ.**—1 in 10. **B.P. Dose.**—½ to 2 ozs.

Non-Official Preparation.

1. **Acetum Hygrophilæ.**—Dried leaves 2 ozs., distilled vinegar 16 ozs. Macerate 3 days, then press and strain. *Dose.*—½ to 1½ ozs.

Pharmacology and Therapeutics.

The entire plant is considered by Indians to possess diuretic and demulcent properties. It is therefore used as a diuretic in cases of **dropsy** and **hepatic obstruction** and as a diuretic and demulcent in **urinary affections** such as **cystitis** and **gonorrhœa.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

HYOSCYAMI FOLIA.

Hyoscyamus Leaves. N. O. *Solanaceæ.*

Syn. B.P.—Henbane Leaves. **Habitat.**—Britain.

Source.—The fresh leaves and flowers, with the branches to which they are attached, of *Hyoscyamus niger*, also the leaves and the flowering tops separated from the branches and carefully dried, collected from the flowering biennial plants.

Characters.—Leaves vary in length up to 10 in., sessile, alternate, exstipulate, triangular-ovate or ovate-oblong, acute, sinuate, pale-green, furnished with glandular hairs particularly underneath. Branches cylindrical and glandular-hairy, corolla yellow, odour strong, taste bitter and slightly acrid when fresh.

Resembles.—Belladonna and Stramonium leaves, neither of which is hairy.

Composition.—Two crystallisable alkaloids (1) *Hyoscyamine* and (2) *Hyoscine* (Scopolamine), and a poisonous oil.

Incompatibles.—Liquor potassæ, lead acetate, silver nitrate, and vegetable acids.

Action.—Anodyne, sedative, narcotic.

Official Preparations.

1. **Extractum Hyoscyami Viride. B.P. Dose.**—2 to 8 grs.
2. **Pil. Colocynthidis et Hyoscyami.**—See Colocynth, page 360.
3. **Succus Hyoscyami. B.P. Dose.**—½ to 1 dr.
4. **Tinctura Hyoscyami.**—1 in 10. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparations.

1. **Chloroformum Hyoscyami.**—Hyoscyamus Root in powder 30, Chloroform 20.
2. **Tinctura Hyoscyami Radicis.**—Hyoscyamus Root in powder 5, Alcohol (60 p.c.) 40, digest for 7 days. *Dose.*—20 to 60 ms.

Pharmacology.

Hyoscyamine, the principal alkaloid in hyoscyamus, is isomeric with atropine and is easily converted into the latter in the presence of a fixed alkali at the ordinary temperature. Most of the properties of hyoscyamus must therefore be naturally identical with those of belladonna and stramonium (see Belladonna, page 264). The following are however the chief points of difference: (1) Hyoscyamus is less deliriant and has a marked and rapid **sedative and soporific effect on the cerebrum.** (2) It has also more pronounced **sedative action on the spinal cord.** (3) It *increases* the **peristaltic contraction** *of the intestines* and is at the same time more efficacious **in relieving griping and irregular contraction,** thereby acting as a carminative. (4) It is **not** a powerful *stimulator* **of the heart.** (5) It relieves **irritation of the urinary passages,** *especially that of the bladder.* This it does by depressing the terminal ends of the nerves of the mucous membrane,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

and controlling the spasms of the muscular fibres. (6) Hyoscine *diminishes intraocular tension*, and therefore hyoscyamus does not affect this so much as belladonna. Some authorities say that it acts as a laxative, but the writer has not observed this effect in medicinal doses.

THERAPEUTICS.

Besides its use in those cases where belladonna is indicated, it is employed (1) to soothe cerebral excitement and produce sleep, as in **mania** and **insomnia**; (2) to lessen **cardiac asthma**; (3) to correct the painful griping of purgatives; (4) to relieve **vesical spasm** in cystitis, prostatitis, calculus, &c., often in combination with other urinary sedatives as buchu, pariera, &c. and the alkalis; and (5) to relieve cough, as in bronchitis.

Children can bear very large doses, while the old and weak cannot.

HYOSCINÆ HYDROBROMIDUM.

Hyoscine Hydrobromide.

Syn. B.P.—*Hydrobromate of Hyoscine, Scopolamine Hydrobromide.*

Source.—The hydrobromide of an alkaloid contained in hyoscyamus leaves, different species of Scopola, and other solanaceous plants.

Characters.—In colourless, transparent crystals, permanent in the air and soluble 1 in 4 of water, not 1 in 1 as in the B.P.

Action.—Hypnotic. **B.P. Dose.**—$\frac{1}{200}$ to $\frac{1}{100}$ gr. either by the mouth or hypodermically. May be increased to $\frac{1}{60}$ gr.

NON-OFFICIAL PREPARATIONS.

1. **Injectio Hyoscinæ Hypodermica.**—1 in 200 ms. of distilled water. *Dose.*—1 to 2 ms.
2. **Hypodermic Lamels** contain $\frac{1}{300}$ gr. each with gelatin.
3. **Guttæ Hyoscinæ.**—2 grs. in water 1 oz.
4. **Ophthalmic Discs** contain $\frac{1}{600}$ and $\frac{1}{300}$ gr.

PHARMACOLOGY AND THERAPEUTICS.

Hyoscine has a powerful sedative action on the convolutions of the brain and produces sleep, and is largely employed in **mania, insomnia, insanity, delirium tremens,** and **puerperal mania.** It is not a depressant to the heart, though it slows the pulse, but till more is known of its action it is not safe to use it in valvular diseases, with a failing compensation. It has a prolonged mydriatic action. It acts wonderfully in calming maniacal excitement. Merck's preparation should alone be prescribed, as the commercial specimens vary much in purity. It is safer to use at first a lower dose $\frac{1}{600}$ to $\frac{1}{100}$ gr. hypodermically.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

The writer used it with good results in a case of hysterical insanity with wakefulness in doses of $\frac{1}{100}$ gr.

Schneiderlein recommmends a combination of Scopolamine and morphia for the production of general anæsthesia. He injects $\frac{1}{200}$ gr. of Scopolomine Hydrobromide and $\frac{1}{6}$ gr. of a Morphia salt on the night previous to the operation, and a similar or larger dose in the morning before the operation. This usually produces deep sleep and the patients do not wake till some hours after the operation, thus escaping the most painful period.

HYOSCYAMINÆ SULPHAS.

Hyoscyamine Sulphate.

Source.—The sulphate of an alkaloid contained in hyoscyamus leaves and possibly other solanaceous plants.

Characters.—A crystalline, deliquescent, odourless powder, having a bitter, acrid taste.

Tests.—It is distinguished from atropine by its brilliant **golden yellow scales**, when its acidulated solution is acted upon by the solution of auric chloride; whilst with atropine, the precipitate has a **dull pulverulent appearance.**

Action.—Sedative and hypnotic. **B.P. Dose.**—$\frac{1}{200}$ to $\frac{1}{100}$ gr. by the mouth or hypodermically.

Non-Official Preparations of Hyoscyamine.

1. **Hyoscyaminæ Hydrobromidum.**—In small white granular crystals soluble 3 in 1 of water. *Dose.*—$\frac{1}{120}$ to $\frac{1}{60}$ gr.
2. **Injectio Hyoscyaminæ Hypodermica.**—Sulphate 1 gr., Distilled Water 2 drs. *Dose.*—1 to 2 ms.
3. **Hypodermic Lamels.**—$\frac{1}{60}$ gr. in each.
4. **Ophthalmic Discs.**—$\frac{1}{100}$ gr. each.
5. **Hyoscyamine granules.**—$\frac{1}{200}$ gr. each. Useful in sea-sickness.

Pharmacology and Therapeutics.

Hyoscyamine resembles in action atropine more than hyoscine, but its mydriatic effect is more intensified. It has been used in **mania, insomnia, delirium tremens, chorea, neuralgia, asthma** and **paralysis agitans,** with less benefit than hyoscine. Ringer says that he tried it in delirium tremens without any success, and found identical results in acute mania with atropine. Sometimes it produces sleep where opium has failed. Only Merck's preparation is reliable. It should be used with caution.

IODOFORMUM.

Iodoform. Tri-iodomethane. CHI_3.

Source.—Prepared by the action of iodine on ethylic alcohol in the presence of solution of potassium carbonate. $C_2H_6O + 4I_2 + 3K_2CO_3 = CHI_3 + KCHO_2 + 5KI + 2H_2O + 3CO_2$.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Shinning, lemon-yellow, small, hexagonal crystals, unctuous to the touch, with a persistent and disagreeable odour and taste. Volatilises slowly and contains iodine 96. 7 p. c. *Solubility.*—Slightly in cold water, 1 in 7 of ether, 1 in 14 of chloroform, 1 in 120 of alcohol (90 p.c.), 1 100 of glycerin, 1 in 30 of olive oil, and also in fixed and volatile oils. Sparingly in Benzol. *Impurities.*—Soluble yellow colouring matters, iodides, picric acid.

Incompatible.—Calomel.

Action.—Antiseptic, deodorant and alterative.

B.P. Dose.—½ to 3 grs. in pill or emulsion.

Official Preparations.

1. **Suppositoria Iodoformi.**—3 grs. in each. A local antiseptic and anæsthetic.

2. **Unguentum Iodoformi.**—1 in 10. Antiseptic, disinfectant and antisyphilitic.

Non-Official Preparations.

1. **Iodoformum Præcipitatum.**—A primrose-yellow, impalpable powder.

2. **Buginarium Iodoformi et Eucalypti** (Cheyne).—Iodoform 5 grs., Eucalyptus oil 10 ms., Cacao butter 35 grs. in each. In gonorrhœa.

3. **Collodium c. Iodoformo.**—Iodoform 1, Collodion Flexile 12. As a pigment in venereal sores and glandular swellings.

4. **Emulsio Iodoformi.**—Iodoform 10, Glycerin 70, Water 20. For injection into sinuses, and abscess cavities.

5. **Insufflatio Iodoformi** (T. H.).—Iodoform 1, Bismuth Subnitras 1 or Iodoform 2, Starch 1. Mix. In affections of the ear, nose and throat.

6. **Nebula Iodoformi** (T. H.)—Iodoform 40 grs. in ether 1 oz. Strong antiseptic and detergent.

7. **Iodoform Dressings.**—**Gauze**, 5, 10, 20 p. c.; **Wool** and **Lint**, 3, 5 and 10 p. c.; **Plaster Mulls**, 10 p. c.

8. **Iodoform Varnish.** *Syn.*—*Whitehead's Paint.*—Contains Iodoform 10 p. c. in Tr. Benz. Co. of which ether is substituted for alcohol.

9. **Pastillus Iodoformi** (T. H.).—1 gr. with glyco-gelatin 18 grs. in each. In syphilitic eruptions of the tongue, mouth, throat &c.

10. **Ung. Iodof. c. Atropina.**—Iodoform precipitated 60 grs., Atropine 2 grs., Soft Paraffin 1 oz. Dissolve atropine by heat, and mix Iodoform when cold.

11. **Unguentum Iodo-Paraffini.**—Iodoform 1, Oil of Eucalyptus 8, dissolve by gentle heat, and add to melted Paraffin 27 and Soft Paraffin 6, stir until cold.

Substitutes for Iodoform.

1. **Airol.** *Syn.*—Bismuth Oxy-iodo gallas.—See Bismuth, (P. 278).

2. **Antiseptol.** *Syn.*—*Cinchonine Iodo-sulphate.*—Iodine 50 p. c. Cheap and free from odour. Ointment 1 dr. in 1 oz. zinc ointment for lupus, &c. (Shoemaker).

3. **Aristol.** *Syn.*—*Di-Thymol-Iodide.*—prepared by mixing solution of iodine in potassium iodide with thymol solution. A reddish-brown powder insoluble in water and glycerin, but soluble in collodion, ether

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

and oils. Useful in ulcerative lupus, tinea, eczema, psoriasis, when applied as an ointment 10 p. c., or dusted, or in collodion.

4. **Bismuth Resorcinate Sodium phospho-salicylate.** and **Subgallate** (see Bismuth p 278).

5. **Creosal** and **Cresalol** are powerful antiseptics superior to iodoform, since they are harmless and less disagreeable in their odour, besides have astringent action. The former is given in 15 grs. in intestinal phthisis, and the latter in 3 to 8 grs. in diarrhœa and typhoid fever

6. **Di-iodoform.** *Syn.—Ethylene Periodide.*—Prismatic, yellow inodorous needles, insoluble in water, soluble in chloroform and ether.

7. **Eka-Iodoform.**—A compound of iodoform and paraform having strong antiseptic action.

8. **Eudoxin.**—See Bismuth page 278.

9. **Europhen.** *Syn.—Isobutyl-ortho-cresyl-iodide.*—Yellow amorphous powder with saffron odour, containing 28 p. c. iodine, insoluble in water and glycerin, but soluble in chloroform, ether. Used as a dusting powder and ointment 10 p. c. It is bland, unirritating and harmless and is considered to be the best substitute for iodoform. Flick rubs ½ oz. solution (1 in 20) of olive oil in early phthisis into the groins and armpits with good effect. Used also hypodermically 15 ms. of a 1 p. c. solution in olive oil in secondary syphilis.

10. **Iodoformin.**—A compound of iodoform and hexamethylene-tetramine. A white powder turning yellow by exposure.

11. **Iodoformal.**—A compound of iodoform and ethyl-hexamethylene-hydriodide possessing higher antiseptic properties than either iodoform or iodoformin.

12. **Iodoformogen.**—A compound of Iodoform with 90 p. c. albumen. A wound dressing.

13. **Idoformum Rituminatum.**—A compound of tar and iodoform, having an aggreeable odour. Employed like iodoform in the powdered form.

14. **Iodol.** *Syn.—Tetra-Iodo-Pyrrol.*—A brownish-white powder without disagreeable smell and toxic action, insoluble in water, but soluble in 1 in 145 of glycerin, alcohol, chloroform and ether. Externally it acts like iodoform, and internally like potassium iodide in 5 to 10 grs. in pill or capsule.

15. **Iodo-Salicylic Acid** and **Di-Iodo-Salicylic Acid.**—Are compounds of iodine and salicylic acid and having the combined action of both. Antipyretic, analgesic and antirheumatic. Succeeded where salicylates failed. The dose of the latter 20 grs. and upwards.

16. **Loretin.**—A yellowish odourless crystalline powder, being a non-irritating and non-poisonous substitute.

17. **Losophan.** *Syn.—Meta-Tri-Iodo-Cresol.*—A greyish crystalline odourless powder containing iodine 80 p.c. Recommended as an antiparasitic.

18. **Nosophen.** *Syn.—Tetra-iodophenol-phthalein.*—A cream-coloured almost odourless powder containing 60 p.c of iodine. Combines with bases (see Bismuth, p. 278). A good intestinal antiseptic. *Dose*—3 to 8 grs. The sodum salt of Nosophen is a blue powder known as **Antinosin**; and the bismuth salt is a reddish-brown powder known as **Eudoxin.**

19. **Napthol-Aristol.** *Syn.—Di-Iodide of B-naphthol.*—A greenish, yellow, odourless, tasteless powder, employed in skin diseases.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

20. **Sanoform.** *Syn.—Methyl-Di-Iodo-Salicylate.*—Light-white odourless non-poisonous, un-irritating crystals, containing iodine 60 p.c. Said to possess wonderful desiccating properties, useful in ophthalmic practice, and ulcers.

21. **Sozoiodol Salts.**—**Sozoiodol** is Di-Iodo-Para-Phenolsulphonic Acid, containing iodine 54 p.c., sulphur 7 p.c, and phenol 20 p.c. It combines with **Sodium, Potassium, Ammonium, Lead, Mercury** and **Zinc,** which form odourless substitutes.

22. **Sulphaminol.** *Syn.—Thio-oxy-diphenylamine.*—A yellow tasteless, odourless, harmless powder, which splits up into sulphur and phenic acid when in contact with the fluids of the body. Useful in laryngeal phthisis and nasal discharges as insufflation. *Dose.*—4 grs. in cystitis.

23. **Thio-Resorcin** and **Di-iodo-thio-Resorcin.**—They are compounds of sulphur and resorcin, and are odourless, non-poisonous amorphous powders. The former is yellowish-white and the latter brown.

24. **Thiuret.**—Is a crystalline derivative of sulphaminol and phenol sulphonate. Nascent sulphur is given off when in contact with moist surfaces.

25. **Traumatol.** *Syn.—Iodocresol.*—An insoluble odourless substitute containing iodine 54 p.c.

Besides the above, there are many more which are not important.

PHARMACOLOGY.

Externally.—Iodoform when locally applied is a **deodorant, antiseptic** and **disinfectant.** This action is due to the decomposition of the iodoform and the liberation of nascent iodine by many agents, such as living cells, ptomaines, light, air, &c.; but before this decomposition can take place the iodoform must first be dissolved in the fats of the tissues. None of the agents above mentioned have any effect upon undissolved iodoform. This decomposition, as one would expect, does not take place very rapidly. It must not therefore be supposed that when iodoform is applied to a wound iodine is set free so abundantly as to cause local irritation; on the contrary iodoform is a **local anæsthetic.**

Internally.—The precise action of iodoform within the body is not well understood. To a certain extent it acts like an iodide. In the stomach, it acts as a **sedative** and **depresses** the **heart.** In large doses it produces toxic symptoms. It is eliminated by the **breath** as iodine and by the **urine** as iodides and iodates.

Toxic action.—Acute poisoning is rare now. Chronic poisoning may take place either from repeated doses, or from absorption from a raw surface. The symptoms are malaise, vertigo, dilatation of the pupil, loss of appetite, gastro-intestinal disturbance, quick feeble pulse, fever (temperature sometimes rising to 104 F.), delirium, mania or melancholia, erythema and perhaps eczema, convulsions, collapse and at times death. Fatty degeneration of the liver and muscles, hæmaturia, and albuminuria sometimes occur. These symptoms may come on suddenly, or may develop gradually, lasting for weeks. Moorhof says that poisoning never occurs if iodoform is used alone, and without other antiseptics. The statement is however incorrect. Some persons are peculiarly susceptible

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

to iodoform, and toxic symptoms have occurred after the slightest dusting of the powder upon a small wound.

Treatment of iodoform poisoning.—If iodoform is dissolved in the fats and ptomaines present in a wound, iodine is set free. Its vapour then passes into the body-fluids and is resolved by the *alkaline* serum into five molecules of iodates and one of iodide. In those tissues having an *acid* reaction iodine is again set free and *acts on the tissue on which it is liberated.* The **cerebral cortex**, the **mucous membrane of the stomach**, and the **sweat glands**, all have an *acid* reaction. Hence the cerebral, gastric and cutaneous symptoms in iodoform poisoning and it now appears to be established that by giving 15 grs. of sodium bicarbonate every hour, we can alleviate the symptoms and lessen the ill-effects of the drug. Stimulants, diaphoretics and sponging the skin with warm water are also recommended.

THERAPEUTICS.

Externally.—Iodoform is employed as a local antiseptic, but the strong characteristic smell is the chief drawback to its use. However, it can be disguised by coumarin (50 p. c.) or oil of geranium (1 in 25). Any of the numerous substitutes can be used instead. It is extensively employed in surgery in various forms such as, dusting, collodion, ointment, emulsion, bougie, gauze, wool, &c., in **wounds, sloughing sores, lupus, rodent syphilitic and scrofulous ulcers, chancres, bedsores, cancers, ozœna, abcess cavities, sinuses, fistulæ, gonorrhœa, granular lids,** &c. Iodoform soaked in glycerin and water and covered over by cotton wool may be usefully employed in **burns.** The ointment removes **itch.** Collodion iodoform subdues **mumps, buboes** and **chronic glandular enlargements.** The writer uses saturated collodion with great success in these diseases, and also applies it over **neuralgic spots** and **gouty** and **rheumatic joint inflammations.** Iodoform inunction and inhalation have been largely employed in **phthisis.** The suppository is used to relieve painful conditions of the bladder and rectum and the ointment gives great relief in **pruritus ani.** Iodoform (1 to 2 grs. in ether) has been injected into the lungs in **phthisis,** and around tubercular joints (about ½ oz. of a 10 p. c. glycerin emulsion). It may be insufflated for otorrhœa and frequently proves extremely beneficial.

Internally.—It is rarely used internally. As a spray, pastil, or insufflation, it is used in syphilitic sores of the mouth, tubercular pharyngitis and laryngitis. It has been unsuccessfully used in **gastric ulcer** and **phthisis.**

Caution.—The weak and the aged are liable to poisoning. Children bear it well.

Prescribing hints.—Iodoform is rarely used for internal administration. In a mixture or lotion, suspend it with mucilage of acacia. When in pill it is massed with glucose, or ¼ its weight of pulv. tragacanth co. Its disagreeable odour is covered by eucalyptus and geranium (5 ms. to 2

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

dr.) oils, balsam of Peru, musk, and coumarin prepared from Tonka beans.

IODUM. Iodine. I.

Source.—A solid non-metallic element obtained from the ashes of seaweeds and sponges and from native iodides and iodates. Hence its old name of "spongia usta." Formerly burnt sponges were largely used in the treatment of tumours without their active principle being understood.

Characters.—Rhombic prisms or octahedrons of a peculiar odour, dark colour, metallic lustre, yielding violent vapour on heating.

Solubility.—1 in 7000 of water, and freely in alcohol (90 p.c.), ether, or solution of potassium iodide. *Impurities.*—Water, iron, iodine cyanide.

Identification.—Easy, its peculiar metalic lustre and suffocating odour at once identify it.

Incompatibles.—Mineral acids, metallic salts, vegetable alkaloids, ammonia.

Action.—Antiseptic, rubefacient lymphatic stimulant, absorbent and alterative.

Official Preparations.

1. **Liquor Iodi Fortis.** *Syn.—Linimentum Iodi.* '85 (altered).—1 in 8½. About 4 times the strength of Tr Iodine.
2. **Tinctura Iodi.**—1 in 40. **B.P. Dose.**—2 to 5 ms. diluted.
3. **Unguentum Iodi.**—1 in 25. Resolvent, irritant, alterative.

Enters into.—The preparation of Arsenic, Iron, Lead, Mercury, Potassium, Sulphur and Sodium Iodides. Of these, Potassium and Sodium Iodides only will be described here.

Non-Official Preparations.

1. **Iodo-Glycerin Solution.** *Syn.—Morton's Fluid.*—Iodine 10 grs., Pot. Iodide 30 grs., Water 25 ms., Glycerine to 1 oz. 30 ms. injected into the sac of a spina bifida.
2. **Iodized Phenol.**—Acid Carbolic and Iodine, equal parts.
3. **Pigmentum Mandl. T. H.**—Iodine 6 grs., Pot. Iodide 20 grs., Ol. Menth. Pip. 5 ms., Glycerin to 1 oz. In granular pharyngitis.
4. **Pigm. Picis c. Iodo.** *Syn.—Coster's Paste.*—Iodine 120 grs., Rectified Oil of Tar 1 oz. Dissolve cautiously by the aid of gentle heat. Useful in ringworm.
5. **Liqr. Iodi. B.P. 1885.** *Syn.—Lugol's Solution.*—Iodine 2, Pot. Iodide 3, Water 40.
6. **Tr. Iodi Decolorata. B.P.C.**—Iodine 250 grs., Rectified Spirit 5½ ozs.; dissolve with a gentle heat, and when cold, add strong solution of Ammonia 10 drs.; keep the mixture in a warm place until decolorised; after which dilute it with Rectified Spirit to 1 pint. Undiluted it may be used as *Tr. Iodi Decolorata Fortior.*
7. **Pasta Amyli Iodidi.**—Starch 1, Glycerin 2, Water 6. Boil together, and add Liq. Iodi B.P. '85, when nearly cold. A good cleanser and healer of sores, especially if syphilitic.
8. **Syrupus Acidi Hydriodici. B.P.C.**—*Dose.*—20 to 60 ms. well-diluted.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

9. **Vapor Iodi.**—Tr. Iodi 1 dr., Water 1 oz. Apply gentle heat and inhale.

10. **Amylum Iodatum, Iodized Starch.**—Iodine 1, Water q.s. to moisten, powdered Starch 20; Triturate. *Dose.*—½ to 4 drs., rubbed up in milk and water. In syphilis and as an **antidote** to unknown poisons. Externally as a substitute for iodoform.

11. **Iodopyrin** or **Iodantipyrine.**—Colourless, inodorous, tasteless antiseptic powder prepared by mixing iodine and antipyrine. Used in asthma and rheumatism with good results. *Dose.*—5 to 10 grs.

12. **Iodine Trichloride.**—Iodine 50 p.c. A yellow powder prepared by interaction of iodine and chlorine gas. A solution (1 dr. to water 1 gallon) is a powerful antiseptic. In fermentative dyspepsia in ½ oz. doses of the solution.

13. **Iodinol** or **Iodipin**—A yellow, oily, liquid, compound of iodine and *sesame* or *teel* oil. Winterniaz considers it more easily assimilable and efficacious than Pot. Iodide. *Dose.*—1 to 4 drs. daily, subcutaneously or by inunction.

14. **Iodo. Caffeine.** *Syn.*—*Sodium-Caffeine Iodide.*—A white powder. Cardiac tonic and alterative. *Dose.*—5 to 10 grs.

15. **Iodothyrin.** *Syn.*—*Thyroiodin.*—An active principle containing iodine extracted from the thyroid gland. A powerful alterative.

16. **Iodalbacid.**—A compound of Iodine and albumen, containing 10 p.c. Iodine. A brown powder, tasteless and odourless. Given in epilepsy and syphilis, may be continued indefinitely. *Dose.*—15 grs.

PHARMACOLOGY.

Externally.—The action of iodine is identical with that of chlorine, but not so energetic. It is a powerful **antiseptic, disinfectant, deodorant** and **antiparasitic,** decomposing organic compounds, and killing germs and parasites. Locally, its action is **irritant, rubefacient** and **vesicant,** according to the strength and length of the application. It stains the skin yellowish-brown and deadens the cuticle which peels off. Iodine dilates local blood vessels and causes exudation of leucocytes, and thus stimulates absorbent vessels. It is a point of practical importance that widespread inflammation of an erysipelatous character may be set up by painting the skin with iodine, especially in children and rheumatic subjects. It may also be absorbed into the circulation when it undergoes the change already described under the head of iodoform, and may, in a similar manner lead to irritation of any internal organ which has an acid reaction.

Internally. **Gastro-intestinal and respiratory tracts.**—It irritates both. In the stomach and intestines it is slowly converted into iodide or iodate of sodium, but much may be left free to cause vomiting, purging and colic. In minute doses it occasionally stops vomiting. Inhalation of iodine produces **irritation** of the respiratory passages, cough, sneezing, frontal and thoracic pain and dyspnœa.

Remote effects.—For a description of these the student is

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

referred to the pharmacological action of iodoform and the iodides. Nothing further need be said here on these points.

THERAPEUTICS.

Externally—The chief application of iodine is a local one. The tincture, ointment or liquor is often used to stimulate **foul, indolent or lupoid ulcers**, and as a counter-irritant in **sub-acute and chronic inflammations** of joints, synovial membranes, lymphatic glands, the pleura, the pericardium, the lungs, liver, spleen, uterus, ovary, periosteum, peritoneum, &c. Tr. iodi has been successfully injected into **abscesses, sinuses, cysts, hydroceles, bronchoceles, joint-cavities, empyema and spina-bifida.** Liquor iodi or linimentum iodi being very strong cannot be painted more than twice, or at the utmost thrice over the same spot. If the application causes much pain and irritation, the iodine can be washed off with alcohol, brandy, whisky or eau-de-cologne, or better still with a solution of potassium iodide or liqr. potassæ. The liquor or tincture may be painted over the chest to help the absorption of **pleuritic fluid**, and to control the harassing cough and the secretion of chronic **bronchitis and phthisis.** Blistering with the strong liquor around or near a threatening **abscess, bubo or carbuncle**, lessens the inflammation. Iodine may also be painted over and around the circumjacent skin, to prevent the spread of **erysipelas and carbuncle.** Coster's paste is an effective application in **parasitic skin diseases**, such as ring-worm, favus and scabies. Iodized phenol is a valuable local application in **endometritis.** To prevent discolouration of the skin Tr. Iodi Decolorata may be employed, but it is not so efficient as the B.P. tincture or ointment. Vapor iodi is an efficacious inhalation in **hoarseness, diphtheria and phthisis.** To prevent bronchial irritation it is inhaled with chloroform and steam. Iodine lotion (Iodine 21 ozs., Pot. Iodide 2 grs., water 1 oz.) removes **opacity of the cornea** when it is of recent origin and does not involve the cornea to any depth.

Internally—Free iodine is rarely used. Tr. iodine painted over the gums and teeth **dissolves tartar**, heals ulcers and stimulates the **growth of gums**, when they have ulcerated and receded. Iodine gargle (2 to 4 drs in water 8 ozs.) checks **mercurial salivation**, and heals **syphilitic and non syphilitic sores** of the mouth and throat. Pigmentum Mandl is a capital application for **chronic granular pharyngitis.** Tr. iodi 1 or 2 drops in 1 oz of water at times checks vomiting, when given every ½ hour. Iodine is recommended in **scrofula, malarial fever and gout** but the writer has used tincture of Iodine in chronic malarial fevers without appreciable benefit. Sometimes iodine does good in **syphilis and scrofula**, where its salts fail.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Caution.—As iodine is a gastro-intestinal irritant, it should be freely diluted and administered after food. In the stomach it is converted into **iodide of starch**, which is less irritant (see Amylum Iodatum). Trousseau gives the tincture in sugared water or in sherry.

POTASSII IODIDUM.

Potassium Iodide. KI.

Source.—(1) Dissolve iodine in a solution of potassium hydroxide and evaporate to dryness; $6KHO+3I_2=5I+KIO_3+3H_2O$. (2) Mix the residue with charcoal and heat, thereby to remove the oxygen of iodate as carbonic oxide; $2KIO_3+6C=2KI+3CO_2$. (3) Dissolve and purify.

Characters.—Colourless, opaque, cubic crystals with a feebly alkaline reaction. *Solubility.*—4 in 3 of water, 1 in 10 of alcohol (90 p. c.) and 1 in 3 of glycerin. *Impurities.*—Iodates, bromides, cyanides, nitrates, &c.

Incompatibles.—Bismuth subnitrates and sp. æther. nitrosi.

Action.—Alterative, resolvent, expectorant, diuretic.

B.P. Dose.—5 to 20 grs. in solution or pill.

Enters into.—Liqr. Iodi Fort. (26¾ grs nearly), Tr. Iodi (10 grs. nearly, Ung. Iodi (17½ grs.) and the

Official Preparations.

1. **Linimentum Potassii Iodidi cum Sapone.**—1 in 10 by wt. A creamy unirritating alterative and resolvent substance, not staining the skin.

2. **Unguentum Potassii Iodidi.**—1 in 10. White; acting in the same way as the above.

SODII IODIDUM.

Sodium Iodide. NaI.

Source.—Prepared from iodine and sodium hydroxide by a process similar to that adopted in making potassium iodide; the salt being crystallised at a temperature of not less than 68°F.

Characters.—A dry white crystalline deliquescent powder having a saline and somewhat bitter taste. *Solubility.*—11 in 6 of water, 1 in 3 of alcohol (90 p. c.) *Impurities.*—The same as of potassium iodide.

Action.—The same as of potassium iodide, but more assimilable and less depressing. **B.P. Dose.**—5 to 20 grs.

Non-Official Iodine Salts.

1. **Ammonii Iodidum.**—A whitish deliquescent salt, becoming yellow from exposure to air (shaking the mixture with a piece of ammon. carb. removes the colour). Freely soluble in water. **Action.**—The same as sodium iodide. *Dose.*—3 to 20 grs.

2. **Rubidii Iodidum.**—In colourless cubic crystals soluble in water. **Action.**—Less depressant and better tolerated by the stomach than potassium iodide. *Dose.*—5 to 20 grs.

3. **Strontii Iodidum.**—White crystalline mass. Dose and action as of Rubidii Iodidum.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY OF IODIDES.

Externally.—Potassium and sodium iodides are freely absorbed, being decomposed by the sweat.

Internally.—The action of the salts of iodine is identical with that of iodine, except that they are less irritant to the gastro-intestinal canal, and are therefore used in preference to iodine. Of these, potassium iodide is the most largely employed. In minute doses it improves appetite and body weight of healthy individuals. It is quickly absorbed and is converted into sodium iodide: this again is slowly decomposed by small quantities of nascent oxygen (set free by living protoplasm) acting upon the iodide in an acidulated solution, the acid being provided either by carbonic acid in the blood, or the acid secretions of different organs. In large doses in produces a group of symptoms known as "**Iodism.**" Besides the characteristic action of iodine, it has a certain definite action of its own. It increases the secretion of bronchial glands during its elimination through the respiratory mucous membrane, producing a flow of thin mucus, and liquefying tenacious secretions; hence it is an **expectorant.** It is also an indirect **antispasmodic.** In large doses, it causes **diuresis,** but how far this diuretic action is due to the large doses of alkali, or to the iodine, is not known. Large doses of the salt (10 grs.) **lessen** the secretion of **milk,** produce **atrophy** of **mammæ** and **testicles,** and destroy **sexual power.** Potassium iodide, or at least the iodine, disengages certain metallic poisons, such as mercury and lead, from their albuminous compounds, forms soluble salts, and removes them from the tissues. It has a specific effect on the **syphilitic virus,** but how this is affected is not known.

Elimination.—Iodides are rapidly eliminated by the mucous membranes, especially those of the air-passages, also by the urine, saliva, mammæ and sweat glands. In escaping through the skin it produces **cutaneous eruptions** starting from the orifices of the sweat glands This is due to the liberation of nascent iodine as already described.

Iodism.—Some individuals are very susceptible to its influence, even ½ to 1 gr. producing symptoms of iodism; while others can bear much larger quantities (1 to 4 drs. daily). The characteristic symptoms of iodism are running of the eyes and nose, sneezing, œdema around the eyes, frontal headache, brassy taste in the mouth, loss of appetite, with irritation of the fauces and trachea. These grow intense if the iodides are pushed, leading to swollen gums, furred tongue, salivation, and in some cases, vomiting, diarrhœa, bronchitis and cutaneous eruptions.

Antidotes.—Carbonate of ammonia, sp. ammon. aromat. or bicarbonate of potassium controls iodism. Fowler's solution prevents skin eruptions.

THERAPEUTICS OF IODIDES.

Externally.—The liniment and ointment of Pot iodide are used for the same purposes as the preparations of iodine, with

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

this advantage, that they neither stain nor irritate the skin, but they are decidedly weaker.

Internally.—Iodides are employed in the same class of diseases where iodine is indicated either internally or externally; but the following deserve a special notice :—

1. **Stomach and Liver**—Potassium iodide given after food, in minute doses say ½ gr. with aromatic spirit of ammonia or ipecacuanha wine is of great service in **atonic dyspepsia**. It is said to do good to **cirrhosis** of the **liver** in its early stage.

2. **Respiratory passages.**—Pot. iodide 10 grs. given at bedtime cuts short an attack of acute **coryza** at the outset, whilst chronic colds are relieved by small doses. In acute **febrile catarrh**, it is serviceable when given with antimonial wine. It relieves **asthma** (15 to 20 grs.) whether dependent on cold or not. In **bronchitis**, it liquefies the phlegm and helps expectoration; and in **pneumonia** and **pleurisy**, helps the absorption of effused products.

3. **Heart and blood vessels.**—It is useful for absorbing the effusion in **pericarditis**, and the deposits over the **cardiac valves**. In **mitral regurgitation** and **aortic obstruction**, the writer obtained excellent results from protracted use. **Internal aneurysms**, with varying pains, are materially benefited by large doses (20 grs. and upwards) of potassium iodide. Here, it acts by reducing the blood-pressure, increasing the coagulability of the blood and influencing the arterial coats. Beneficial effects have been obtained in **angina**, by giving it in the interval between the attacks. Potassium Iodide is also a very valuable remedy in **Arterio-Sclerosis**. Stockman has recently suggested that possibly the value of this drug is due to its acting upon the Thyroid gland and stimulating it to produce a larger amount of Thyroiodin.

4. **Lymphatic glands.**—Iodides together with the local application of iodine, reduce the size of chronic enlargements of lymphatic glands, scrofulous or otherwise.

5. **Kidney.**—Occasionally potassium iodide acts as a powerful diuretic in **Bright's disease** and removes the anasarca wonderfully, but it has little influence on the total amount of albumen.

6. **Brain.**—Many authorities recommend the use of pot. iodide in **hydrocephalus**, but it only acts as a palliative.

7. **Skin.**—Many syphilitic cutaneous diseases, such as **psoriasis** and **erythema**, are sometimes cured by full doses of of iodides.

8. **Scrofula.**—The iodides, especially Syr. Ferri Iodidi, either alone or with codliver oil, have a remarkable effect in **tuberculosis**, when the glands are affected; but they have little effect on the tubercles of the lungs.

9. **Syphilis.**—What mercury is in the primary and secon-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

dary stage, iodides are in the tertiary. Under its use **periostitis, nodes, gummata,** syphilitic **deposits** in the **brain** and other organs disappear with remarkable rapidity. Success depends upon boldly pushing the drug in doses of 20 to 40 grs., 3 or 4 times a day. In secondary syphilis even, it sometimes does great good when combined with corrosive sublimate It cures barrenness of women due to syphilis. In congenital syphilis, the iodides are also efficacious, but the system becomes less tolerant after the poison is destroyed. In primary syphilis they have no effect.

10 **Metallic poisons.**—Pot. Iodide eliminates lead and mercury from the system, magnesii sulphas should always be given in these cases in combination with the iodide, otherwise the metallic salt may be reabsorbed from the bowels. During elimination, mercury may cause salivation. Some authorities recommend this salt in mercurial salivation, but there is a chance of salivation being increased by it, as it is a sialagogue itself.

11. **Rheumatism.—Chronic rheumatism, gonorrhœal rheumatism, rheumatic arthritis** and **chronic gout** always yield to iodides, especially the two former. Pains resembling rheumatism and increasing at night whether due to syphilis or not are removed very quickly by them.

The action of sodium iodide is similar to that of potassium iodide but it is not much used. Ammonium and rubidium iodides are less depressant.

Prescribing hints.—Remember that small doses of iodide will often cause iodism whereas large ones will not. By administering the drug in milk large doses can be given with impunity. Ammonium carbonate or potassium bicarb. also checks the symptom of iodism. See also page 83 and 90.

IPECACUANHÆ RADIX.

Ipecacuanha Root. N. O. *Rubiacæ.*

Syn.—Hippo. **Habitat.**—Brazil.

Source.—The dried root of *Psychoiria Ipecacuanha.*

Characters.—Tortuous pieces, up to 6 in. long. and ¼ in. thick, colour dark brick-red or brown, closely annulated. Fractured surface exhibits a greyish, resinous or starchy cortex, and a dense central portion. Odour slight. Taste bitter. The Carthagena variety (unofficial) is thicker, with annulations less marked. *Impurities.*—Hemidesmus root, cracks, not annulated ; almond powder with Pulv. Ipecac. known by its prussic acid odour when moistened

Identifications.—The bead-like and ringed appearance is pecuilar and characteristic of ipecacuanha. Note its colour and section.

Composition.—(1) *Emetine,* 1·45 p.c. (2) *Cephaeline* 0·52 p.c. (3) An unnamed third alkaloid, 0.04 p.c. The total alkaloids therefore being 2·01 p.c. (4) Ipecacuanhic or cephaelic acid. (5) Starch, volatile oil, gum, &c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

B.P. Dose.—¼ to 2 grs. as an expectorant, and 15 to 30 grs. as an emetic. For a child 1 year old $\frac{1}{12}$ to ¼ gr. as an expectorant, and 2 to 4 grs. as an emetic.

Action.—Expectorant, emetic.

Official Preparations.

1. **Acetum Ipecacuanhæ** (altered).—1 in 20.
B.P. Dose.—10 to 30 ms.

2. **Extractum Ipecacuanhæ Liquidum.** (new).—2 to 2½ grs. alkaloids in 110 ms. **B.P. Dose.**—½ to 2 ms. as an expectorant, 15 to 20 ms, as an emetic.

3. **Pilula Ipecacuanhæ c. Scilla.**—1 in 20. Opium 5 p. c.
B. P. Dose.—4 to 8 grs.

4. **Pil. Ipecac. c. Urginea.** (*Ind. and Col. Addendum*).—Compound Ipecac. Powder 3, Urginea 1, Ammoniacum 1, Syr. Glucose *q.s.* Opium 1 in 20. **B.P. Dose.**—4 to 8 grs.

5. **Pulvis Ipecacuanhæ Comp.** *Syn.*—*Dover's Powder.*—Ipecac. 1 opium 1 in 10. Fawn coloured. Diaphoretic, anodyne.
B.P. Dose.—5 to 15 grs.

6. **Trochiscus Ipecacuanhæ.**—½ gr. in each.

7. **Troch. Morphinæ et Ipecacuanhæ.**—$\frac{1}{60}$ gr. morph. and $\frac{1}{12}$ gr. Ipecac. Acts like Dover's powder.

8. **Vinum Ipecacuanhæ** (altered). **B.P. Dose.**—10 to 30 ms. as an expectorant, 4 to 6 drs. as an emetic, 1 dr. as an emetic for a child 1 year old.

Non-Official Preparations.

1. **Pulvis Ipecac. sine Emetina. De-emetized Ipecacuanha.**—Said to be equally efficacious in dysentery without causing vomiting. *Dose.*—10 to 30 grs.

2. **Syrupus Ipecacuanhæ** —Ipecac. 1, Alcohol (90 p.c.) 5, Water 40, digest 48 hours, filter 40, add Sugar 60 to make 100.

3. **Syr. Ipecac. Aceticus. B.P.C.**—Acetum Ipecac. 1 pint., Sugar 36 ozs., dissolve by gentle heat. *Dose.*—½ to 2 drs.

4. **Tinctura Ipecacuanhæ.**—Ipecac. 1, Alcohol (60 p.c.) 10; digest 8 days, make to 10.

5. **Emetine Hydrochloride** and **Emetine Hydrobromide.**—In silky filaments. *Dose.*—$\frac{1}{60}$ to $\frac{1}{10}$ gr. (expectorant); $\frac{1}{6}$ to $\frac{1}{3}$ gr. (emetic). Emet. Hydrochlor. 1 gr. in sherry 8 ozs., make **Vinum Emetinæ** of the same strength as Vin. Ipecac. Powerful expectorant and emetic.

6. **Cephaeline Hydrochloride.**—In colourless crystals. More powerful emetic than emetine. *Dose.*—$\frac{1}{12}$ to ¼ gr.

Pharmacology.

Externally.—Powdered ipecacuanha acts as an **irritant, rubefacient** and **pustulant** on the unbroken skin. Inhaled it produces irritation of the eyes and nose, sneezing, bronchial secretion, leading sometimes to asthma. It kills anthrax bacilli.

Internally. **Alimentary canal and liver.**—It has an unpleasant bitter taste and excites flow of saliva. In small doses (¼ to ½ gr.) it increases the secretion of the gastric juice by stimulating

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the local circulation, and is therefore **stomachic** and **tonic**. In large doses it creates nausea with secretion of mucus. In larger doses, 15 to 30 grs., it produces vomiting, partly by its direct influence on the peripheral ends of the pneumogastric, and partly by stimulating the vomiting centre; hence it is a **direct** and **indirect emetic** (see page 125). This indirect emesis can be produced by injecting emetine or cephaeline after cutting the pneumogastric. The vomiting is slow but certain and is unaccompanied by much nausea or prostration. In drop doses ipecacuanha wine acts as an **antiemetic** in certain conditions.

Large doses no doubt **irritate** the **intestines**, causing hyperæmia, stimulation of the glands and peristalsis, hence there is a considerable amount of secretion, leading to purging.

The **liver** is **directly stimulated** by the alkaloids of ipecacuanha and there is a plentiful secretion of bile, therefore ipecacuanha is a **direct cholagogue** (see page 131).

Heart and blood.—Emetine and cephaeline are absorbed into the blood from the mucous membranes and excreted by them; especially those of the respiratory tract, stomach, and intestines. They have no definite action on the blood. They depress the heart in larger doses.

Respiratory tract.—During elimination, ipecacuanha powerfully stimulates the bronchial mucous membrane, causing hyperæmia, and **increases its secretion**; consequently it is an **expectorant**. Rossbach has demonstrated that emetine increases the tracheal secretion like apomorphine.

Skin.—Moderate doses ($\frac{1}{2}$ to 1 gr.) stimulate the skin and produce **diaphoresis**, which action is increased by the combination with opium (Dover's powder).

THERAPEUTICS.

Externally.—Ipecacuanha is rarely used, though recommended in anthrax. Applied as a paste it allays the pain of wasp and hornet stings.

Internally. **Alimentary canal.**—As a stomachic tonic, powdered ipecacuanha ($\frac{1}{4}$ to $\frac{1}{2}$ gr.) is used with other stomachics and bitters in **atonic dyspepsia**. Ipecacuanha wine in 1 m. doses every $\frac{1}{4}$ or $\frac{1}{2}$ hour remarkably checks the **vomiting of pregnancy, alcoholism, migraine** and **gastric irritability** during febrile attacks and other diseases. In cases where it fails, the writer combines it with $\frac{1}{4}$ m. of dilute hydrocyanic acid with good results; ipecacuanha is not a suitable emetic in **poisoning** as its action is tardy, but it is exceedingly efficacious in **croup** and **bronchitis** of children, not only by mechanically expelling the mucus, but by its influence on the respiratory mucous membrane. The subsequent depression is highly beneficial. 1 to 2 drs. of the wine must be given every 1 or 2 hours until the child vomits. With some it merely acts as a purgative. It

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

makes an excellent emetic in bilious attacks and in the early stage of fevers. The compound powder sometimes gives good results in **gastric ulcers.**

Powdered ipecacuanha in 20, 30 or even 60 or 90 grs. cures **acute dysentery,** but how it does this is not known. Some patients can retain such large doses, while others cannot. To prevent its being rejected, it is better to give an opium draught, or a hypodermic injection of morphine an hour before the administration of the drug. Keep the patient in a recumbent position, and allow no water or food for at least four hours afterwards. If it is brought up even then, it can be injected per rectum, suspended in mucilage, with 15 to 20 ms. of liquid extract of opium. De-emetized ipecacuanha (Merck) may be usefully employed, but is not so efficient as the powdered root. In subacute and chronic cases and **diarrhœa,** Dover's powder acts well. The **dysenteric diarrhœa** of children, acute or chronic, generally yields to drop doses of ipecacuanha wine (Ringer).

It is a most effective remedy for **catarrhal jaundice** and **torpidity of the liver,** when given alone or combined with other cholagogues. The writer cured a few cases of such jaundice with ipecacuanha and gentian pills. It is a favourite constituent of aperient and cathartic pills.

Respiratory passages.—As an expectorant, ipecacuanha in the form of wine, acetum, liquid extract, lozenge or syrup, is being daily used in colds, catarrhs, acute and chronic bronchitis and broncho-pneumonia. The inhalation of ipecacuanha spray benefits **winter cough, bronchial asthma, bronchitis** *accompanied by dyspnœa* and bronchitis of old emphysematous persons. It is worth trying in suitable cases. Ipecacuanha is also recommended in **hay asthma** and **whooping cough.** In **acute pneumonia,** large doses have been given with success.

In nauseating doses it is recommended in **hæmoptysis** and hæmorrhages from other organs, but it has no specific influence over them, beyond depressing the circulation.

IRIDIN. B.P.C.

Source.—An extract obtained from the root of *Iris Versicolor,* the Blue Flag.

Characters.—A dark brown powder, having a bitter acrid taste.

Action.—Cathartic, alterative, diuretic.

Dose.—1 to 3 grs.

Pharmacology and Therapeutics.

Iridin is used in biliousness and all sluggish conditions of the liver. It should be administered in the form of a pill made up with glycerin of tragacanth or extract of hyoscyami. It may be usefully combined with euonymin and podophyllin.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ISPAGHULA. Spogel Seeds.

N.O. *Plantagineæ.*

(*Ind. and Col. Addendum*).

Syn. I.V.—*Isupgul*, Beng., Hind.
Habitat.—India and Eastern Colonies.
Source.—The dried seeds of *Plantago ovata.*
Characters.—About $\frac{1}{16}$ in. long and $\frac{1}{26}$ in. wide. Ovate eliptical, boat-shaped, pinkish; the convex side bearing a dark spot.
Composition.—(1) *Mucilage*, 1 in 20 of water forms a thick tasteless jelly. (2) *Fatty oil* and albuminous matter.
Action.—Demulcent, mild astringent. **B.P. Dose.**—50 to 150 grs.

Official Preparation.

1. **Decoctum Ispaghulæ.**—13·7 of seeds to 1000 of water.
B.P. Dose.—½ to 2 ozs.

Pharmacology and Therapeutics.

Externally.—The bruised seeds, moistened with water, form an excellent emollient poultice, and can be used for the same purposes as linseed. When made with vinegar and oil they are applied over rheumatic and gouty swellings.

Internally.—Ispaghul has long been known and used by the people of India as a remedy for **diarrhœa** and **dysentery.** Its beneficial effects are more marked in the chronic stages. Many cases of inflammatory diarrhœa and dysentery yield to its use when other remedies fail. It is supposed to form a protective layer of mucilage over the inflamed parts of the intestinal mucous membrane. It is generally taken, in these cases, alone with water (1 in 40) when it forms a mucilaginous mass. Many of the swollen seeds pass out with the motions, and their action is supposed to be mechanical as well as astringent over the intestinal ulcers. The writer often combines it with bruised *kurchee seeds* (*Wrightia antidysenterica*), commonly known as "*Indrujab*," the dose is five grs. every two or three hours, and this combination will be found to yield most encouraging results. The decoction is also used as a demulcent in **cough** and **sore-throat**, and formed into a *shurbet* (seeds, sugar and water) it is largely used as a cooling beverage in **gonorrhœa** when it acts as a mild diuretic and soothes the irritation of the urethra during micturition.

The mucilage exists in the covering of the seeds only, and a decorticated preparation, known as "*Isuphghul ka chilka*", can be obtained from any *pansari's* shop. This preparation should be used if there is any fear of irritation of intestinal ulcers from the seeds.

The remedy is tasteless and is well suited both to adults and children.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

JABORANDI FOLIA.

Jaborandi Leaves. N.O. *Rutaceæ.*

Syn.—Pilocarpi Foliola.

Habitat.—Brazil (Pernambuco).

Source.—The dried leaflets of *Pilocarpus jaborandi.*

Characters.—Dull green, oval-oblong or oblong-lanceolate, 2½ to 4 in. long, shortly petiolate, obtuse and emarginate apex, unequal base, entire revolute margin, coriacious texture. Mature leaflets glabrous with prominent veinlets on the upper and scattered hairs on the under surface. Odour aromatic when bruised. Taste at first bitter aromatic, afterwards pungent, increasing flow of saliva. *Impurities.*—Leaves of several species of *piper.* In Brazil these are all known as jaborandi.

Identification.—The prominent midrib and translucent dots with the *emarginate apex* at once distinguish it. Mark its shape and colour.

Composition.—(1) *Pilocarpine*, the chief alkaloid, is a colourless liquid. (2) *Jaborine* (isomeric) antagonistic to pilocarpine and resembling atropine in action. (3) *Pilocarpidine.* (4) *Jaboridine.* The last two are probably oxidation products of pilocarpine and jaborine, and acting also respectively like them.

Action.—Sialagogue, diaphoretic and expectorant.

Official Preparations.

1. **Extractum Jaborandi Liquidum.**—1 in 1. **B.P. Dose.**—5 to 15 ms.
2. **Tinctura Jaborandi.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparation.

1. **Infusum Jaborandi.**—½ oz. to 10 ozs. of boiling water for ½ hour. *Dose.*—1 to 2 ozs.

PILOCARPINÆ NITRAS.

Pilocarpine Nitrate. $C_{11}H_{16}N_2O_2$, HNO_3.

Source and Characters.—The nitrate of an alkaloid obtained from jaborandi leaves, in white crystalline powder, soluble in 8 or 9 parts of cold water, and slightly in alcohol (90 p.c.). **B.P. Dose.**—$\frac{1}{10}$ to ½ gr.

Non-Official Preparations.

1. **Pilocarpinæ Hydrochloridum.**—Minute, white deliquescent crystals *Dose.*—$\frac{1}{10}$ to ½ gr.
2. **Guttæ Pilocarpinæ.**—Pilocarpine Nitrate 2 grs. Water 1 oz. Myotic.
3. **Pilocarpine Hair Lotion.**—Pilocarpine nitrate 2 grs., Quinine murias 8 grs., Glycerin 2 drs., Aqua Rosæ 6 drs. Mix.
4. **Pilocarpinæ Phenas, Pilocarpine Carbolate.**—A colourless oily liquid soluble in water and alcohol. A solution 1 gr. in 10 ozs. of 2·75 p.c. of phenol solution, is called **Aseptoline**, an American speciality, and is used in intermittent fever and phthisis in 1 fl. dr. hypodermically.
5. **Pilocarpinæ Salicylas.**—Small colourless tabular crystals or crystalline powder. *Dose.*—$\frac{1}{10}$ to ½ gr.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

6. **Unguentum Pilocarpinæ.**—Pilocarpine Nitrate 4 grs., Vaseline ½ oz., Lanoline ½ oz. Stimulates the growth of hair.

PHARMACOLOGY.

Jaborandi in many respects resembles physostigma in action (see Physostigma).

Externally—Pilocarpine **contracts the pupil** by stimulating the terminal ends of the third nerve, causing tension of accommodation, and disturbance of vision.

Internally.—Pilocarpine readily enters the circulation and is carried to different structures where it produces definite effects, which are described below under separate heads :—

Digestive apparatus.—Within about 10 minutes after administration, jaborandi produces a copious secretion of saliva of almost normal composition, by directly stimulating the peripheral ends of the nerves supplying the salivary glandular cells and partly the salivary nerve centre. Therefore it is a **powerful sialagogue**, (see page 122), the secretion amounting to a pint and a half at times. The salivation is immediately stopped by injection of atropine. The peristaltic movements of the unstriped muscles of the gastro-intestinal canal are increased owing to direct stimulation of the solar plexus. The muscular coat of the intestine is not affected by pilocarpine. The gastric juice and intestinal secretion are also increased. The **biliary secretion is unaffected,** but the **spleen contracts.**

Skin.—The next important action is on the skin. Within 6 to 10 minutes after the hypodermic injection of pilocarpine nitrate (¼ to ⅓ gr.) the face, neck and ears become flushed, and drops of perspiration appear upon them, soon extending over the whole surface. The sweating is so profuse as to soak garments and bed clothes, 15 to 20 ozs. may thus be excreted by one diaphoresis. Therefore it is a **powerful sudorific** (see page 148). This action is due to the stimulation of the nerve terminations in the glandular cells. It also stimulates the growth of hairs, and makes them coarse and black.

Circulatory apparatus.—Both the heart and pulse are accelerated at first, but are soon slowed and depressed. The vessels first dilate ; and the blood pressure falls temporarily, but rises again, and finally falls. Atropine counteracts the slowing of the pulse, but it cannot do so if the vagus is cut ; thus showing that pilocarpine depresses the heart by stimulating the peripheral terminations of the vagus in the heart.

Respiratory passages.—Jaborandi increases both the nasal and bronchial secretions.

Eyes and ears.—Locally applied, or given by the mouth or subcutaneously, it causes contraction of the pupil. It increases the flow of tears and secretion of cerumen. This contraction of the pupils, which is prevented by the previous use of atropine,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

is due to stimulation of the endings of the oculo-motor nerve. There is no stimulation of the sphincter muscle itself and the action of the drug in this respect differs from that of physostigmine.

Urinary tract.—Very small doses, frequently repeated, no doubt increase the **flow of urine**, but it is diminished when the sweating is copious. Pilocarpine is eliminated with the urine. Urea is said to be excreted both in the saliva and sweat. By its contractile effect on the **bladder**, it causes suprapubic pain and irresistible desire to pass water.

Body heat and weight.—On account of the excitement of the cutaneous circulation before sweating, there is a slight rise of temperature, but it soon falls during sweating. There is also a reduction of body weight to the extent of 7 pounds or more.

Female generative organs.—Pilocarpine causes the uterine muscles to contract, sometimes to such an extent as to cause abortion. It also increases uterine and vaginal mucus, and promotes secretion of milk.

Summary of actions.—It will be observed that pilocarpine performs **two** most important specific functions viz :—(1) The **stimulation of secretion**, (2) the **contraction of the involuntary muscular fibres** due to stimulation of the nerve endings and not to that of the muscular fibres themselves. **Salivation, diaphoresis** and **myosis** are the most marked effects. Children are less affected than adults.

Antagonists.—Belladonna and atropine. $\frac{1}{150}$ gr. of atropine given subcutaneously arrests profuse salivation and diaphoresis within 5 to 10 minutes.

THERAPEUTICS.

Externally—To promote the growth of hair, pilocarpine is largely employed in the form of a hair-lotion. In ophthalmic practice, it has been locally applied in **iritis, retinitis, detachment of the retina, glaucoma**, &c, but it is less active than physostigmine, and its effects more transitory.

Internally.—Pilocorpine has been used in all sorts of diseases, but is now chiefly employed for its diaphoretic action in **uræmia** and **convulsions**, where it may be the means of saving life by the elimination of urea and other products through perspiration. It is of special service in **Bright's disease**. Pilocarpine, in small doses, or the liquid extract (10 ms.) increases diuresis, reduces albumen and blood, and moistens the mouth. When there are **anasarca** and **serous effusions**, $\frac{1}{6}$ to $\frac{1}{4}$ gr. of pilocarpine nitrate produces profuse sweating and salivation, thereby relieving the water logged system. The diaphoresis can be helped by wrapping the patient in warm blankets, and giving him warm drinks. It has been used in **bronchitis, pertussis, asthma, diphtheria, laryngitis, tonsillitis, diabetes, amenorrhœa, uterine diseases, hydrophobia, myxœdema**, &c, with

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

varying results. Ringer considers pilocarpine, when given in $\frac{1}{30}$ gr. doses three times a day, an efficient drug for checking excessive perspiration, as in phthisis. For its antagonistic properties it is used in poisoning by belladonna Josham considers that $\frac{1}{4}$ gr. subcutaneously injected has a remarkable effect in **calming drunkards**. In **alopecia, prurigo, urticaria** it has been given with some benefit. Patients suffering from **deafness, due to disease of the auditory nerve**, are sometimes benefited by pilocarpine.

Caution.—Sometimes alarming prostration and collapse may follow the hypodermic injection of $\frac{1}{4}$ gr. ; and atropine should at once be injected. It should be used with great caution in valvular diseases of the heart, fatty heart, emphysema, pleurisy, and the patient watched. Children are less affected than adults.

JALAPA. Jalap.

N. O. *Convolvulaceæ.*

Habitat.—Mexico.

Source.—The dried tubercules of *Ipomœa purga.*

Characters.—Dark brown ; oblong, ovoid or fusiform roots ; 1 to 3 in. long ; larger ones incised ; hard, compact, and heavy. Externally furrowed, wrinkled, with small transverse scars. Internally yellowish-grey or dingy brown. Section exhibits irregular concentric lines. Odour characteristic. Taste sweet at first, acrid and disagreeable afterwards.

Identification.—Most easily identified, its appearance is very characteristic. It is distinguished even in powder as its smoky odour and brown colour are very peculiar.

Composition.—(1) *Resin* (*off*) 9 to 11 p.c., which again is composed of two glucosides. (*a*) *Convolvulin, insoluble in ether*, (*b*) *Jalapin, soluble in ether.* It must be noted that the term *Jalapin* has been applied to the resin of *Spurious Jalap*, which is similar to the *true* resin of scammony. The nomenclature is misleading.

Action.—Hydragogue purgative.

B.P. Dose.—5 to 20 grs. in cachets or in confection.

Enters into.—Pulv. Scammon. Co. and the

Official Preparations.

1. **Extractum Jalapæ.**—A dark-brown extract.

B. P. Dose.—2 to 8 grs. in pill.

2. **Pulvis Jalapæ Compositus.**—1 in 3. Like Dover's powder in appearance. **B.P. Dose.**—20 to 60 grs. in cachets or confection.

3. **Tinctura Jalapæ.**—1½ p.c. resin. A deep-brown liquid. Standardized. **B.P. Dose.**—½ to 1 dr.

4. **Tinctura Jalapæ Co.** (*Ind. and Col. Addendum.*).—Jalap 262 grs. Scammony 175 grs., Turpeth 88 grs , Alcohol *q. s.* to 1 pint by percolation. For use in Indian and Australasian Colonies.

JALAPÆ RESINA.

Jalap Resin.

Source and **Characters.**—A dark-brown, opaque, brittle extract obtained from jalap, readily soluble in alcohol (90 p.c.), not in water. Taste acrid.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Resembles.—Aloes, which is bitter.
Enters into.—Pilula Scammonii Compositus.
B.P. Dose.—2 to 5 grs.

Non-Official Preparations.

1. **Sapo Jalapinus.**—Resin 4, Soap 4, Alcohol 8 by weight. Evaporate to 9.

2. **Jalapin (British).**—A whitish powder, containing 90 p.c. of convolvulin. *Dose.*—1 to 5 grs. Mayer's Jalapin, which is cheaper, consists chiefly of Orizabin, the principal constituent of Spurious Jalap. It is a less active purgative and is identical with Scammonin. Jalapin is said to be the active principle of the proprietary remedy known as "*Tamar Indien.*"

Pharmacology.

Internally.—Jalap closely resembles scammony in actions with this difference, that (1) it is **less irritant** and **contracts less** violently the intestinal muscular fibres, and therefore causes less griping; and (2) it produces a **greater stimulation** of the intestinal glands, and is therefore **more hydragogue.** It does not purge unless in contact with the bile. *Small doses* have a **laxative** effect, but large ones produce several watery stools attended with pain and griping. Its action is entirely local, for it does not purge when subcutaneously injected. It has a feeble **cholagogue action.**

Therapeutics.

Internally.—Being a **hydragogue purgative,** Pulv. Jalap. Co. is employed in drawing off water in **dropsy, ascites, anasarca** : from whatever causes they may arise. It is also used in **obstinate constipation,** and is a **revulsant** in **congestion** of the **brain, apoplexy,** and **engorgement** of the **right heart.** Jalap is an excellent purgative in **Bright's disease** and **uræmia.** The resin in small doses can be given in **habitual constipation.** It should not be prescribed where the bowels are inflamed or liable to inflammation.

JUNIPERI OLEUM.

Oil of Juniper. N. O. *Coniferæ.*

Syn. I.V.—*Aarar Ká tel,* Hind. *Hab-ul-arar Ka tel,* Bomb.
Habitat.—North of Europe and North-west Himalaya.
Source.—The oil distilled from the full-grown unripe green fruit of *Juniperus communis.*
Characters.—Colourless or pale-greenish yellow; odour characteristic; taste aromatic bitter. Sp. gr. 0·865 to 0·890. *Solubility.*—1 in 20 of alcohol (90 p.c.).
Composition.—Contains (1) a hydrocarbon *Terpene* ($C_{10}H_{16}$) isomeric with oil of turpentine and which by contact with water yields

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

white crystalline hydrous compound $C_{10}H_{16}H_{20}$; (2) *Polymeric hydrocarbon* ($C_{20}H_{22}$).

Action.—Stimulating diuretic, carminative, and antispasmodic. **B.P. Dose.**—½ to 3 ms.

OFFICIAL PREPARATION.

1. **Spiritus Juniperi.**—1 in 20. If not clear, shake with powdered talc and filter. **B.P. Dose.**—20 to 60 ms. *Enters into.*—Mistura Creosoti.

PHARMACOLOGY.

Internally.—Oil of juniper resembles oil of turpentine in its action, but it is a more powerful **renal stimulant** and **diuretic**, and is more agreeable to the stomach. In large doses, it **excites the genital organs** like cantharides, causing strangury and priapism. It is absorbed into the blood and is excreted with the urine, to which it imparts an odour of violets. The diuretic effect is observed in dropsy, whilst in health it is said to diminish the urine secreted.

THERAPEUTICS.

Internally.—Sometimes it is used as a stomachic, stimulant and antispasmodic, but it is chiefly employed as a diuretic in **cardiac** and **hepatic dropsy**, and in some forms of **chronic Bright's disease**. It should not be used in acute renal affections. It is best given with salines. Gin and Hollands contain it and they can be used as alcoholic beverages in the above diseases.

KALADANA. Kaladana.

N.O. *Convolvulaceæ.* (*Ind. and Col. Addendum.*).

Syn. B.P.—Pharbitis Nil. **Syn. I.V.**—*Kalá daná*, Beng., Hind.

Habitat.—India and Eastern Colonies.

Source.—The dried seeds of *Ipomea hederacea.*

Characters.—$\frac{3}{16}$ in. long and wide, in segments of spheres. Black throughout, brown and hairy only at the hilum. Taste sweetish at first, then acrid.

Composition.—*Pharbitisin*, a resin, about 8 p.c. It resembles the resin of jalap, (*convolvulin*), and corresponds to it in chemical properties.

Action.—Mild purgative. **B.P. Dose.**—30 to 50 grs. in powder.

OFFICIAL PREPARATIONS.

1. **Pulvis Kaladanæ Co.**—Kaladana 5, Acid Pot. Tartrate 9, Ginger 1. **B.P. Dose.**—20 to 60 grs.
2. **Tinctura Kaladanæ** —4 in 5 of alcohol (70 p.c.).

B.P. Dose.—½ to 1 dr.

KALADANÆ RESINA.

Kaladana Resin.

Source and Characters.—A resin obtained from kaladana seeds. In brownish opaque fragments translucent at the edges; brittle, break-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ing with a resinous fracture, of a disagreeable odour, specially when warmed.

B.P. Dose.—2 to 8 grs.

Pharmacology and Therapeutics.

The action and uses of kaladana and its resin are the same as those of Jalap (q.v.), but it is a milder remedy. In small doses it is a gentle purgative, but in larger ones, especially in the form of Pulv. Kaladanæ Co. it has a drastic action and can therefore be used with benefit as a derivative in all cases of dropsy.

KAOLINUM. Kaolin.

Source.—A native aluminium silicate, powdered, and freed from gritty particles by elutriation.

Characters.—A soft whitish powder insoluble in water or in dilute acids.

Enters into.—Pilula phosphoricum.

Non-Official Preparation.

1. **Ung. Kaolini.**—Vaseline 1, Hard Paraffin 1, melt, and add Kaolin 1; stir till cold. An emollient application to abraded surfaces and a useful excipient for silver nitrate, potassium permanganate and bichromate pills (See page 86.).

Uses.

Besides its use as an **excipient**, it can be employed as a dusting powder in **intertrigo, weeping eczema**, &c.

KAVÆ RHIZOMA. Kava Rhizome.

N. O. *Piperaceæ.* (*Ind. and Col. Addendum.*)

Syn.—"Kava-Kava." **Habitat.**—Australasian Colonies.

Source.—The dried decorticated rhizome, without roots, of *Piper methysticum.*

Characters.—½ to 2 in. thick, in irregular fragments of a pale greyish colour.

Composition.—(1) *Kavalin* or *Methysticin* about 1% a neutral crystalline principle allied to 'Piperin.' (2) Two resins, one of which is *Kawine.* (3) An essential oil.

B.P. Dose.—5 to 10 grs.

Official Preparation.

1. **Extractum Kavæ Liquidum.**—1 in 1 of alcohol 90 and 45 p.c. **B.P. Dose.**—30 to 60 ms.

Pharmacology and Therapeutics.

Kava is a useful bitter tonic with an agreeable taste, and a stimulant. Taken in small doses it sharpens the mental faculties and removes fatigue and languor, therefore it resembles caffeine. In larger doses it acts upon the spinal cord, when it causes an

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ataxic gait, the intellectual faculties remaining unaltered. As a local anæsthetic it acts like cocaine, and when applied to a mucous membrane it produces burning followed by anæsthesia. In toxic doses Kava produces general anæsthesia and paralysis by its depressing action on the cord and the peripheral endings of the sensory nerves. This action is mainly due to the resin *kawine* present in it. It is a diuretic, and many authors claim for it an alterative action upon the **genito-urinary organs**. It is said to be useful in **gonorrhœa**, especially when accompanied and complicated with **gout, gleet** and **cystitis**. In the form of an infusion it is taken as an intoxicating liquor which it is said has an antisyphilitic virtue.

The best form for administration is the liquid extract.

KINO. Kino.

N. O. *Leguminosæ.*

Syn. I. V.—*Pit-sal*, Beng. *Bija, Bijasar*, Hind.

Habitat.—Malabar in India.

Source.—The juice, obtained from incisions in the trunk of *Pterocarpus marsupium*, evaporated to dryness.

Characters.—Small, angular, glistening, opaque, reddish-black, brittle fragments; transparent and ruby-red at the edges, inodorous. Astringent, tinging the saliva red. *Solubility.*—Partially in cold water, almost entirely in alcohol (90 p.c.).

Composition.—(1) *Kino-tannic acid*, 75 p.c. (2) *Kinoin*, a neutral crystalline substance. (3) *Pyrocatechin*. (4) *Kino red*. (5) *Gum*.

Incompatibles.—Alkalis, mineral acids, metallic salts, carbonates, gelatin.

Action.—A strong intestinal astringent. **B.P. Dose.**—5 to 20 grs. in cachets.

Enters into.—Pulv. Catechu Co. and the

OFFICIAL PREPARATIONS.

1. **Pulvis Kino Compositus.**—3 in 4. 1 opium in 20.
B.P. Dose.—5 to 20 grs.
2. **Tinctura Kino.**—1 in 10. **B.P. Dose.**—½ to 1 dr.

NON-OFFICIAL PREPARATION.

1. **Trochisci Kino** (T. H.).—2 grs. in each, with Black Currant paste.

KINO EUCALYPTI.

Eucalyptus kino. (*Ind. and Col. Addendum*).

Syn. B.P.—Botany Bay kino.

Habitat.—Australasian Colonies.

Source.—An exudation from the stem of various species of eucalyptus, having the characters and answering to the tests for kino.

B.P. Dose.—5 to 20 grs. in powder.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

Internally.—Kino resembles catechu and krameria in action. As it contains 75 p. c of **kino-tannic acid**, it is a powerful intestinal astringent, and a useful remedy in **diarrhœa** and **dysentery**. In **relaxed conditions of the throat**, the lozenge affords great relief. Sometimes it is given in **hæmorrhages** as a substitute for tannic acid.

Prescribing hints.—Tinct kino, made in the ordinary way, is apt to gelatinise. This may be prevented by adding the kino to boiling water, keeping the mixture at 100° C. for 12 hours. It is then allowed to cool and the alcohol added, after which it is set aside for 12 hours and then filtered.

KRAMERIÆ RADIX

Krameria Root. N.O. *Polygalaceæ.*

Syn. B.P.—Rhatany Root.

Source.—The dried root of (1) Para Rhatany, a species of krameria attributed to *krameria argentea;* or of (2) Peruvian Rhatany *krameria triandra.*

Characters.—(1) *Para.*—Cylindrical pieces, purplish-brown, smooth thick bark, marked by deep cracks and adhering firmly to the reddish-brown coloured wood. Fracture short. (2) *Peruvian.*—Dark reddish-brown, readily separable from yellowish woody axis. Bark thinner than of *Para*, rough and scaly. The bark of both kinds has a strong astringent taste, and tinges saliva red.

Composition.—(1) *Rhatanhia-tannic acid*, 20 p.c. (2) Rhatanhia red, the colouring matter (3) Rhatannin, neutral substance.

Incompatibles.—Alkalis, lime water, iron and lead salts and gelatin.

Action.—A powerful astringent and tonic. *Dose.*—20 to 60 grs. in powder.

Enters into.—Pulv. Catechu. Co and the

Official Preparations.

1. **Extractum Krameriæ.** *Syn. B.P.—Extract of Rhatany.*—A deep reddish brown *solid* extract. **B.P. Dose.**—5 to 15 grs. in pill or with chalk mixture.

2. **Infusum Krameriæ.** *Syn. B.P.—Infusion of Rhatany.*—1 in 20 (½ hour). **B.P. Dose.**—½ to 1 oz.

3. **Liquor Krameriæ Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.

4. **Tinctura Krameriæ.** *Syn. B.P.—Tincture of Rhatany.*—1 in 5. A deep red liquid. **B.P. Dose.**—½ to 1 dr.

5. **Trochiscus Krameriæ.** *Syn. B.P.—Rhatany Lozenge.*—1 gr. in each

6. **Trochiscus Krameriæ et Cocainæ.** *Syn. B.P.—Rhatany and Cocaine lozenge.*—1 gr. extract and $\frac{1}{10}$ gr. Cocaine Hydrochloride in each.

Non-Official Preparations.

1. **Ext. Krameriæ Fluidum U.S.**—Rhatany root 1, exhaust with dilute Alcohol and Glycerin to make 1 of fluid extract.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. **Gossypium Krameriæ T. H.**—Tincture of Rhatany ½ oz., Glycerin 10 ms., Cotton Wool 60 grs. Saturate and dry.

3. **Suppositorium Krameriæ.**—Extract of Rhatany 8 grs., Morph. Hyd. $\frac{1}{10}$ gr., Stearin 10 grs.

4. **Syr. Krameriæ U.S.**—Fluid Extract of Krameria 45, Syrup 55.

Pharmacology and Therapeutics.

Internally.—Rhatany is a powerful **astringent**, because of the tannic acid it contains. The powdered root forms an important ingredient in many dentifrices and the tincture in mouth-washes. A teaspoonful of tincture in 1 oz. of water or the infusion of the root, makes a good gargle in **relaxed sore throat, spongy** and **ulcerated gums** and **mercurial stomatitis.** Krameria and cocaine lozenge is very efficacious in **sore throat.** The infusion may also be used in **gonorrhœa** and **leucorrhœa.** Krameria is one of the best intestinal astringents in **diarrhœa,** and may be employed as well, in **hæmatemesis** and **melæna.** As a remote **hæmostatic** it is now seldom used.

LAUROCERASI FOLIA.

Cherry-Laurel Leaves. N. O. *Rosaceæ.*

Habitat.—Britain (cultivated).

Source.—The fresh leaves of *Prunus laurocerasus.*

Characters.—Thick, coriaceous, short petioled, oblong or obovate, 5 to 7 in. long, tapering towards each end, recurved at the apex, distantly but sharply serrate, dark green, smooth, shining above, paler below. Midrib prominent, with glandular depressions on either side. Inodorous, bitter almond odour when bruised.

Composition.—(1) *Hydrocyanic acid* and (2) a *Volatile oil* by a process of decomposition as in bitter almonds (See page 233).

Incompatibles and antidotes.—The same as of dilute hydrocyanic acid. (See page 191.)

Official Preparation.

1. **Aqua Laurocerasi.**—1 lb. to 1 pint. Should contain $\frac{1}{10}$ p.c. HCN. Should be standardized if necessary. It requires also to be tested occasionally as it loses strength by keeping. Sedative.

B P. Dose.—½ to 2 drs.; 20 ms. equal to 1 m. of hydrocyanic acid dil.

Pharmacology and Therapeutics.

Aqua laurocerasi possesses the properties of acid hydrocyanic dil., but, as its strength is apt to vary on account of the volatilization of the prussic acid it contains, it is not generally used in stead of the acid; although often prescribed as a flavouring agent.

LAVANDULÆ OLEUM.

Oil of Lavender. N. O. *Labiatæ.*

Source.—The oil distilled from the flowers of *Lavandula vera* cultivated in England and the western shores of the Mediterranean.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Pale yellow or colourless with fragrant odour of flowers and a pungent bitter taste. Sp. gr. not below 0·885. *Solubility.*—1 in 4 of alcohol (70 p.c.). *Impurities.*—Oils of spike and turpentine.

Composition.—(1) *Linalool*, an alcohol and oxidation product of terpene myrcene. (2) *Linalool acetate*, the principal constituent of oil of bergamot. The value of the oil depends upon the latter ingredient, which should be 30 p.c. (3) Pinene $C_{10}H_{16}$ is present in some samples but is not a constant constituent.

Action.—Stimulant, carminative.

B.P. Dose.—½ to 3 ms. Rarely used alone.

Enters into.—Lint. Camph. Ammon. and the

OFFICIAL PREPARATIONS.

1. **Spiritus Lavandulæ.**—1 in 10. **B.P. Dose.**—5 to 20 ms. on sugar.

2. **Tinctura Lavandulæ Composita.**—45 ms. to 1 pint. A bright crimson liquid. **B.P. Dose.**—½ to 1 dr. for colouring mixtures.

Enters into.—Liqr. Arsenicalis, to prevent formation of moulds.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Oil of lavender is used to perfume liniments, and the tincture to colour lotions. It is an ingredient of smelling salts and lavender water.

Internally.—Like other aromatic oils, it is a stimulant, carminative and anti-spasmodic, and can be used in **flatulence, colic, hypochondriasis, hysteria,** and **neurasthenic affections.** But its chief use is confined to colouring and flavouring purposes.

LECITHIN. (*Non-official.*)

Syn.—Ovo-Lecithin.

Source.—It is a normal constituent of brain substance and yolk of egg.

Characters.—A yellowish wax-like substance, insoluble in water.

Composition.—It is *choline-di-stearo-glycerophosphate.*

Action.—Nerve stimulant.

Dose.—Internally, 3 to 5 grs. Hypodermically, ¼ to 2 grs. in sterile olive oil.

PHARMACOLOGY AND THERAPEUTICS.

Causes increase in body-weight and improves general nutrition. Used in **phosphaturia, neurasthenia, diabetes, incipient tuberculosis, rickets,** and **osteomalacia**; also in **tabes dorsalis** and **general paralysis.**

It should be prescribed either in the form of tabloid or granules.

LIMONIS CORTEX.

Lemon Peel. N.O. *Rutaceæ.*

Habitat.—South of Europe.

Source.—The fresh outer part of the pericarp of the fruit of *Citrus medica* var. *B. Limonum.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Pale yellow, rough outside from glands containing volatile oils imbedded in it; inner surface should have a thin white portion. Odour characteristic, fragrant. Taste warm, aromatic, bitter.

Composition.—(1) *Volatile oil, Oleum Limonis* (off.). (2) *Hesperidin*, a bitter principle.

Enters into.—Inf. Aurantii Co., Inf. Gent. Co. and the

Official Preparations.

1. **Oleum Limonis.**—A pale yellow bitter aromatic *volatile oil* obtained from fresh lemon peel; chiefly used for flavouring.

B.P. Dose.—½ to 3 ms. *Enters into.*—Lin. Pot. Iod. cum Sapone, Spt. Ammon. Aromat., Tr. Guaiaci Ammoniata, and Tr. Valer. Ammon.

2. **Succus Limonis.**—30 to 40 grs. of citric acid in 1 oz. A slightly turbid yellowish liquid, being the freshly expressed juice of the ripe fruit of *Citrus medica* Var. *B. Limonum.*

110 ms. of lemon juice are neutralised by 11½ grs. of Pot. Bicarb., 9½ grs. of Sod. Bicarb., and 16½ grs. of Sod. Carbonate. Acid Citric is prepared from it.

3. **Syrupus Limonis.**—1 peel and 25 juice in 65. A yellowish syrup. **B.P. Dose.**—½ to 1 dr.

4. **Tinctura Limonis.** (Altered).—1 in 4. Sherry coloured. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparation.

1. **Citral.**—An aldehyde having 15 times more flavouring power than the oil.

Pharmacology and Therapeutics.

Internally.—The actions of lemon peel are similar to those of orange peel. The oil is a stimulant and carminative and can be used to expel intestinal flatus. In practice both of them are used for flavouring purposes. Lemon juice is antiscorbutic. Whitla says that the decoction of sliced fresh unpeeled lemon is a valuable antiperiodic in malaria.

LINUM. Linseed.

N.O. *Lineæ.*

Syn.—Flax. **Syn. I.V.**—*Tisi, Mashina*, Beng. *Alsi*, Hind.

Habitat.—Britain, Holland, Russia and India.

Source.—The dried ripe seeds of *Linum usitatissimum.*

Characters.—Small, brown, glossy, nearly flat, ⅛ to ¼ in. long, ovate, obliquely pointed, surface glabrous. Internally yellowish-white with two oily cotyledons. *Envelope, or testa, mucilaginous.* Three varieties are seen in Calcutta, brown, white and red.

Composition.—(1) *Mucilage* in the testa. (2) *Fixed oil* (off), which consists of *glyceryl* combined with *linoleic acid*; 25 to 30 p.c.

Action.—Demulcent, emollient and nutrient.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparations.

1. **Linum Contusum.** *Syn.—Linseed Meal.*—Linseed reduced to coarse powder, should be recently prepared. Used in making **Cataplasma Lini.** (See Cataplasms, page 67.)

2. **Oleum Lini.**—The oil expressed from linseed at ordinary temperatures. Viscid, yellow, with faint odour and bland taste. Boiled and Dutch oils are to be avoided. Fresh oil should, if possible, be used.

Pharmacology and Therapeutics.

Externally.—Contused linseed in the form of a warm poultice is used to disperse threatening **abscesses, boils, carbuncles lymphangitis** or **local inflammations,** by dilating the local blood-vessels, and relaxing the tissues, thereby relieving the tension and pain caused by pressure over the periphery of the sensory nerves. But if the poultice is too hot it increases pain and tension. If the leucocytes have already passed through the coats of the vessels, and **suppuration** has commenced, a warm poultice helps it to reach the surface. Hot linseed meal poultice is an excellent, mild, continuous **counter-irritant** for **deep-seated inflammations,** such as **pneumonia, bronchitis, broncho-pneumonia, pleuritis, pericarditis, peritonitis, arthritis, pelvic cellulitis,** &c. The counter-irritant effect can be greatly increased by dusting powdered mustard over the surface of the poultice, or mixing it (1 in 16) with the meal. Iced poultice may also be employed in **pneumonia** or other local inflammations.

The oil makes a good emollient application to **burns** and **scalds** in the form of **carron oil** (see page 296). The oil can also be used as an *enema* (1 lb.) in impacted conditions of the rectum and lower colon.

Internally.—Linseed tea, *i.e.*, the infusion of linseed, especially when combined with lemon, is a reputed domestic demulcent drink in **throat cough.** Possibly it has a slight expectorant effect. The ordinary formula for linseed-tea is linseed 2½ drs, liquorice root 1 dr., boiling water 10 ozs., infuse for two hours. This can be taken sweetened with sugar. It has a slightly diuretic action and a patient with an **irritable bladder** or suffering from **gonorrhœa** often finds relief by copious linseed drinks.

LITHII CARBONAS.

Lithium Carbonate. Li_2CO_3.

Source.—Obtained from native silicates of lithium.

Characters.—In white powder or minute crystalline grains. *Solubility.*—1 in 70 of water, insoluble in alcohol (90 p.c.). *Impurities.*—Lime, alumina, &c.

Action.—Antacid, diuretic and antilithic. **B.P. Dose.**—2 to 5 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

LITHII CITRAS.

Source.—Prepared by saturating citric acid with lithium carbonate.

Characters.—A white crystalline deliquescent salt.

Solubility.—1 in 2 of water.

Action.—The same as of carbonate.

B.P. Dose.—5 to 10 grs. freely diluted in ærated water.

Official Preparation.

1. **Lithii Citras Effervescens.**—1 in 20. A white granular powder. **B.P. Dose.**—60 to 120 grs.

Non-Official Preparations of Lithium.

1. **Lithii Benzoas.**—A white crystalline powder, soluble 1 in 14 of water. Antilithic. *Dose.*—15 to 30 grs.

2. **Lithii Bromidum.**—A white granular deliquescent salt, soluble 1 in 1 of water. Contains nearly half as much again of bromine as the same weight of potassium bromide. A good hypnotic in gout. Used in insomnia, epilepsy, Bright's disease. *Dose.*—5 to 15 grs.

3. **Lithii Guaiacas.**—Consists of Lithium oxide 1, Guaiacum resin 3. Introduced by Garrod for chronic gout and rheumatism. *Dose.*—5 grs. twice daily.

4. **Lithii Hippuras.**—White minute crystals, soluble in water. Powerful antilithic. In uric acid, gravel, gout and rheumatism. *Dose.*—5 to 20 grs.

5. **Lithii Iodidum.**—White powder, soluble in water. *Dose.*—1 to 5 grs.

6. **Lithii Salicylas U.S.**—A deliquescent white powder. *Dose.*—5 to 20 grs.

7. **Lithii Tartras Acidus.**—Finely crystalline. Specially useful in gouty cases with gum affections. *Dose.*—5 to 20 grs.

8. **Lithio-piperazine.**—A powerful solvent of uric acid in 10 grs. doses.

9. **Lithium Symphorol.**—A powerful diuretic in 15 grs. in gout and dropsy. Contains caffeine-sulfonic acid.

10. **Uricedin.**—Soluble brownish-yellow granules containing citrate of lithium with citrates and sulphates of alkalis. Used in uric acid diathesis, urinary calculi, gout and articular rheumatism. *Dose.*—1 to 2 drs.

11. **Uropherin.** *Syn.*—*Lithium Diuretin.*—A white powder, soluble in water, powerful diuretic in Bright's disease and cardiac dropsy. *Dose.*—5 to 15 grs.

Pharmacology.

Internally.—Lithium salts are readily absorbed and are believed to increase the **alkalinity of blood.** They resemble the corresponding potassium salts in their actions: with this difference that, (1) they are powerful **solvents of uric acid,** by combining with it and forming *urate of lithium,* which is very soluble, (2) they are *stronger diuretics,* and (3) they are **less depressant to the**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

heart, in which respect they more closely resemble sodium than potassium salts. They render the urine alkaline, holding in solution excess of uric acid, therefore their prolonged use helps to dissolve uric acid calculi. Hence, they are urinary lithontriptics. They are eliminated by the urine. Recent investigations have thrown considerable doubt upon the value of lithia as a solvent of uric acid in the human body. In a test tube it is a beautiful solvent, but when taken internally it forms a nearly insoluble triple phosphate with phosphate of soda, which not only prevents its action on uric acid but puts out of use a certain amount of phosphate, which is itself a solvent for uric acid. Moreover, as a matter of fact, Haig has shown that the administration of lithia actually decreases the elimination of uric acid by the urine.

THERAPEUTICS.

Externally.—A lotion of the carbonate (1½ drs. to 1 pint) applied on lint and covered with guttapercha is a useful local application for removing gouty inflammation of joints, gouty ulcers and deposits.

Internally.—Lithium salts were formerly considered to be of special value in both acute and chronic gout, by helping the solution of biurate of sodium, and eliminating it. For its solvent action on uric acid, they were given in uric acid diathesis and uric acid calculi, but the recent observations alluded to above have now rather discredited lithium as a remedy for gout and lithiasis. The salts should be freely diluted before administration. The carbonate 5 grs. given with ærated water 10 ozs. does not irritate the stomach, but lithii citras effervescens is more agreeable, although it becomes a carbonate in the blood. Up to 1 oz. of the citrate may be given daily.

LOBELIA. Lobelia.

N.O. *Lobeliaceæ.*

Habitat.—North America.

Source.—The dried flowering herb of *Lobelia inflata.*

Characters.—Stems angular, channelled, with narrow wings; purplish, hairy, scarred. Leaves alternate, toothed, hairy. Capsules inflated, two-celled, containing brown seeds. Odour irritating. Taste after chewing, burning and acrid.

Composition.—(1) *Lobeline*; a volatile liquid oily alkaloid. (2) *Lobelic acid* remains united with lobeline. (3) *Lobelacrin.*

Incompatibles.—Caustic alkalis, which decompose lobeline.

Action.—Depressant, antispasmodic, diaphoretic and diuretic.

OFFICIAL PREPARATION.

1. **Tinctura Lobeliæ Ætherea.**—1 in 5. **B.P. Dose.**—5 to 15 ms.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparations.

1. **Lobeline Sulphate.**—In deliquescent, yellow, friable pieces, soluble in water. Used in asthma, dyspnœa, whooping cough, and spasmodic neuroses. *Dose.*—$\frac{1}{20}$ gr. or more with caution.

2. **Tinct. Lobeliæ. B.P. 85.**—2½ ozs. to 1 pint. By maceration and percolation with proof spirit. *Dose.*—10 to 30 ms.

Pharmacology.

The action of lobelia resembles that of tobacco in many respects.

Internally. **Gastro-intestinal canal.**—Whether absorbed by the skin or the stomach, lobelia, in large doses, produces **gastro-intestinal irritation**, causing vomiting, purging and great prostration. The vomiting is probably due to the primary stimulation of the vomiting centre.

Heart and circulation.—Lobeline enters the circulation. Observations on the frog's heart show that it first stimulates and then depresses, and finally arrests its action in diastole. **Blood-pressure falls.** This is ascribed to its influence over the heart and the paralysis of the vasomotor centre.

Respiratory passage.—It is a powerful **respiratory sedative.** It slows respiration in small doses, and in large ones powerfully depresses the respiratory centre so that **death** takes place from **respiratory failure** before the stoppage of the heart. It relaxes the bronchial muscles, hence it is a **bronchial antispasmodic.**

Nervous system and muscles.—The convolutions are secondarily affected only by toxic doses, when coma, and sometimes convulsions, may occur. Besides its depressing effects on the cardiac, respiratory and vasomotor centres, it lowers the activity of the motor centre of the cord, causing **relaxation of muscles.**

Elimination.—Lobelia is probably thrown off by the skin and kidneys, producing **diaphoresis** and **diuresis.**

Toxic action.—Poisoning is rare. When it occurs, it is usually accompanied by those symptoms already mentioned above, *i.e.*, gastro-intestinal irritation, cardiac and respiratory depression, collapse, coma, cold perspiration, sometimes convulsions and death.

Antidotes.—Pump, emetics, tannin, later on stimulants, as brandy, ammonia, ether, strychnine $\frac{1}{30}$ gr. hypodermically, morphine or opium in small doses, external warmth, friction, sinapisms, horizontal position.

Therapeutics.

Internally.—Therapeutically it is used like stramonium. For its powerful bronchial antispasmodic action it is very often used in **asthma**, either (1) in full doses (½ to 1 dr.) of the tincture every one or two hours, until nausea is experienced, or relief is obtained; or (2) in 10 to 15 ms. every 10 or 15 minutes until the dyspnœa gives way. It must be noted that large doses sometimes

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

cause great depression. If there is more or less dyspnœa throughout 24 hours the patient must have 10 ms. thrice daily, besides a few extra doses during the paroxysm. Often speedier relief is obtained by combining it with bromides, iodides, or morphine, as in the formula used by the writer in bronchial asthma always with success.—Tr. Lobel. Æther. ℥iii, Pot. Iodide ℥ii, Pot. Bromide ℥iii, Aqua Chloroformi ad ℥viii. Mft. mist. $\frac{1}{15}$th part every one or two hours until relieved.

It is used in **spasmodic bronchitis**, and **whooping cough**, relieving the paroxysmal dyspnœa and spasms. It has also been employed in **cough** and **laryngismus stridulus**.

LUPULUS. Hops.

N.O. *Cannabineæ*.

Syn. B.P.—Humulus.

Habitat.—England (Kashmir and Dera Dun).

Source.—The dried strobiles of *Humulus lupulus* collected from cultivated plants.

Characters.—Strobiles 1¼ in. long, oblong-ovoid or rounded, consisting of imbricated greenish-yellow, membranous stipules and bracts, attached to a hairy axis. Odour aromatic. Taste bitter, aromatic and astringent.

Composition.—(1) *Lupulin*, a liquid alkaloid. (2) *Lupulinic acid.* (3) *Valerol* an aromatic oil giving odour. (4) *Resin.* (5) *Tannin.* (6) *Sesquiterpene.*

Incompatibles.—Mineral acids and metallic salts.

Official Preparations.

1. **Infusum Lupuli.**—1 in 20 (½ hour). **B.P. Dose.**—1 to 2 ozs.
2. **Tinctura Lupuli.**—1 in 5. **B.P. Dose.**—½ to 1 dr.

Non-Official Preparation.

1. **Extractum Lupuli. B.P. 1885.** *Dose.*—5 to 15 grs. in pill.

LUPULINUM. Lupulin.

Source and Characters.—A granular brownish-yellow glandular powder obtained from the dried strobiles of *Humulus Lupulus.*

Action.—Aromatic, tonic and sedative. **B.P. Dose.**—2 to 5 grs.

Non-Official Preparations.

1. **Ext. Lupulini Fluidum U.S.**—*Dose.*—10 to 30 ms.
2. **Oleoresina Lupulini U.S.**—*Dose.*—1 to 5 grs.
3. **Tinctura Lupulini U.S.**—1 in 8. *Dose.*—10 to 60 ms.

Pharmacology.

Internally.—Hops belong to the class of aromatic bitters, and are therefore **stomachic and tonic**, due to the aromatic oil and lupulic acid, the bitter principle, they contain. They have also slight **hypnotic** property. Whether this is due to the aromatic

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

oil or the alkaloid is not yet known. The stimulant effect of the aromatic oil is greatly enhanced by alcohol as in beer.

THERAPEUTICS.

Internally.—As a remedy hops are rarely used, but in the form of pure bitter ales, they are extremely serviceable in helping digestion and promoting appetite during convalescence, or where digestion has become enfeebled from any other cause. The official preparations are sometimes given with benefit in **nymphomania, satyriasis, nervous irritability, delirium,** &c. Sometimes they check the morbid desire for drink.

A hop pillow (stuffed with hops instead of cotton) is often very useful as a remedy for insomnia.

MAGNESIA LEVIS.

Light Magnesia. MgO.

Syn. B.P.—Light Calcined Magnesia, Light Magnesium Oxide.

Source.—Prepared by exposing light magnesium carbonate to a dull red-heat.

Characters.—A light bulky white powder, 3½ times lighter than heavy magnesia.

B.P. Dose.—5 to 30 grs. for repeated administration; 30 to 60 grs. for a single dose.

Enters into.—Pulv. Rhei Co.

MAGNESIA PONDEROSA.

Heavy Magnesia. MgO.

Syn. B.P.—Heavy Calcined Magnesia, Heavy Magnesium Oxide.

Source.—Prepared by exposing heavy magnesium carbonate to a dull-heat.

Characters.—A white powder insoluble in water, but readily dissolved by acids. **Incompatibles.**—All acids.

Action.—Antacid, laxative and antilithic **B.P. Dose.**—The same as light magnesia.

MAGNESII CARBONAS LEVIS.

Light Magnesium Carbonate. $3(MgCO_3)$, $Mg(HO)_2$, $4H_2O$.

Source.—Prepared by mixing *cold dilute* solutions of magnesium sulphate and sodium carbonate, boiling for 15 minutes, and filtering, washing and drying: $4MgSO_4 + 4Na_2CO_3 + 5H_2O = 3(MgCO_3)\ Mg(HO)_2 4H_2O + 4Na_2SO_4 + CO_2$.

Characters.—A light white powder consisting of amorphous particles and slender prisms. *Solubility.*—1 in 2500 of cold water.

B.P. Dose.—5 to 30 grs. for repeated administration; 30 to 60 grs. for a single dose.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

MAGNESII CARBONAS PONDEROSUS.

Heavy Magnesium Carbonate. $3(MgCO_3)$, $Mg(HO)_2$,$4H_2O$.

Source.—Prepared as the light carbonate, but with *strong boiling* aqueous solutions.

Characters.—A white granular powder. *Impurities.*—Lime, sulphates.

Action.—Antacid, purgative. **B.P. Dose.**—The same as light carbonate.

Enters into.—The preparation of Magnesia Ponderosa, Troch. Bismuthi Co. and the

c

Official Preparation.

1. **Liquor Magnesii Carbonatis.** *Syn. B.P.—Fluid Magnesia.*—10 grs. in 1 oz. Antacid and agreeable aperient, less liable to form concretions in the colon than lighter preparations. **B. P. Dose.**—1 to 2 ozs.; ½ dr. for a child 1 year old.

Non-Official Preparations.

1. **Mistura Alba.**—Mag. Carb. 1½ drs., Mag. Sulph. 4 drs., Peppermint water 6 ozs. *Dose.*—½ to 1 oz. as an aperient.

2. **Liquor Magnesii Bromidi.**—Neutralise Acid Hydrobromic Dil. 20 ozs. (10 p.c.) with Magnesium Carbonate 1 oz.; filter. *Dose.*—1 to 2 drs. in insanity.

3. **Magnesium Citrate** (Merck).—A soluble salt. *Dose.*—30 to 125 grs.

4. **Magnesium Citratis Liquor. B.P. 1885.** *Syn.—Lemonade Purgative.*—Magnesium Carbonate 100 grs., Acid Citric 200 grs., Syrup of Lemons ½ oz., Pot. Bicarb (cryst.) 40 grs., Water to ½ pint. A pleasant refrigerant draught and saline aperient. *Dose.*—5 to 10 ozs.

5. **Red Mixture.** (Dr. Goodeve's).—Mag. Carb. Pond. 30. grs., Rhubarb 10 grs., Spt. Amon. Aromat. 30 ms., Oil. Anisi 2 drops., Water to 2 ozs. Mix. *Dose.*—One tea-spoonful every 3 or 4 hours till bowels operate.

MAGNESII SULPHAS.

Magnesium Sulphate. $MgSO_4$, $7H_2O$.

Syn. B.P.—Epsom salts.

Source.—Prepared by the interaction of native magnesium carbonate and diluted sulphuric acid, $MgCO_3 + H_2SO_4 = MgSO_4 + H_2O + CO_2$; or purifying the native sulphate.

Characters.—Small, colourless, transparent, rhombic prisms. Taste bitter. *Solubility.*—1 in 1 of cold water.

Identification.—Epsom salts resemble zinc sulphate, but they are distinguished by the absence of metallic taste, the crystals being more or less coherent and by the absence of opaque or powdery appearance when exposed to air.

Incompatibles.—Potassium and sodium carbonates and bi-carbonates, limewater, lead acetate, and tartarated soda which precipitates magnesium tartrate.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Action.—Hydragogue purgative. **B.P. Dose.**—30 to 120 grs. for repeated administration ; ¼ to ½ oz. for a single dose.

OFFICIAL PREPARATION.

1. **Magnesii Sulphas Effervescens.** *Syn. B.P.—Effervescent Epsom Salts.*—Antacid and cathartic. **B.P. Dose.**—60 to 240 grs. for repeated use ; ½ to 1 oz. for a single dose.

NON-OFFICIAL PREPARATION.

1. **Magnesii Salicylas.**—Colourless hygroscopic needles, soluble in water. Given with advantage in typhoid fever in 50 to 100 grs. daily.

PHARMACOLOGY.

Externally.—None.

Internally. **Gastro-intestinal canal.**—Both the oxide and the carbonates are **alkaline**, and neutralise the normal or the excessive acidity of the stomach, and are converted into chloride or lactate, both of which are soluble. What is unaffected is left insoluble. The carbonate sets free carbonic acid, which exerts a local sedative influence. Therefore they are **antacid.** On account of the low diffusion power, the chloride and lactate, though soluble, are not freely absorbed ; consequently almost all the magnesia is transmitted to the intestines, where the chloride is decomposed by the alkaline bile, and the oxide reprecipitated, which is converted first into carbonate and then into bicarbonate by the carbonic acid gas of the bowels. Thus the oxide, the carbonate or the sulphate if directly given, will act as **purgatives** only after conversion into bicarbonates.

Prof. Hay's experiments have proved that magnesium sulphate produces intestinal secretion in proportion to the dosage and strength of the solution administered, no doubt the low diffusion power of the salt preventing the absorption of the secreted fluid; hence, with the retarded absorption and stimulated secretion, the fluid accumulates in the intestines till the quantity amounts to what would be necessary to make about 5 or 6 per cent of the solution of salt. The weaker the solution the less the secretion, and if the salt in the solution is less than 5 per cent there is no secretion into the bowels. Again, if the solution is concentrated and given during fasting, profuse serous discharge within the bowels is the result. Thus, by 1 or 2 ozs. of salt dissolved in its own weight of water, such a hydragogue purgation can be induced, as will be equal to a depletion by blood-letting.

Most of the magnesium salts are passed out unaltered in the stools. Magnesium sulphate does not stimulate the liver.

According to some, magnesium sulphate (2 grs.) given hypodermically purges ; the purgative action is probably due to the paralysis of the inhibitory fibres of the splanchnics.

Blood.—Magnesium salts enter the blood as a chloride or lactate and render the **plasma more alkaline.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Urine.—What little salt is absorbed is passed out by the kidneys, **increasing the flow of urine**, rendering it **alkaline**, and to a certain extent **dissolving uric acid**; but the diuretic effect is weaker than that of the potassium and sodium salts.

THERAPEUTICS.

Internally.—The oxide and the carbonate are largely employed in **acid dyspepsia, heart-burn, pyrosis, vomiting, sick headache**, or any other complaint attended with acidity. Their antacid property is considerably increased by combining them with sodium bicarbonate and sal volatile. As a tasteless, unirritating alkaline laxative, they are often used in combination with rhubarb, as Pulv. rhei co. and Goodeve's "red mixture" in **constipation of children**. Liq. magnesii carb. is an agreeable and alkaline laxative in **acid** dyspepsia accompanied by constipation.

As chemical **antidotes**, they are successfully used in **poisoning** by **mineral acids, oxalic acid**, and the salts of **mercury, arsenic** and **copper**, as they form insoluble compounds with them. In **alkaloidal poisoning**, they hinder the absorption of alkaloids by making the contents of the stomach alkaline. But in order to get these antidotal effects, they must be given in very large doses, which is the only objection. Magnesium sulphate acts as an **antidote** to **lead** and **barium** salts by precipitating their insoluble sulphates.

As a **diuretic** and feeble alkalinizer of blood and urine, they are used in **gout** and **gravel** cases, where the salts of potassium and sodium are not well borne. Many mineral waters containing magnesium are valuable diuretics, such as Harrogate, Carlsbad, Ems, Baden-Baden, &c.

Magnesium sulphate (Epsom salt) is almost daily used as a **purgative**. Its action is less rapid than that of sodium sulphate (Glauber's salt) but is free from nausea and griping. It can be given in the form of Mist. sennæ co. or in solution with aromatics. In **biliousness** or **portal congestion**, it is best given to complete the action of cholagogue pills. It makes an excellent aperient for those who are gouty, and suffer from uric acid gravel. It has been successfully used in **tropical dysentery**, and according to Wyatt-Smith, Mist. alba is a specific for this complaint when given in full doses. Large quantities of **serum** can be drained off through the bowels by giving concentrated solutions during fasting, so that **dropsy, anasarca, ascites, pleurisy**, &c., can be greatly reduced. Many popular mineral waters, such as Hunyadi Janos, Friedrichshall and Pulna owe their purgative action to the magnesium sulphate they contain. The dose of magnesium sulphate can be reduced by mixing it with acid. sulph. dil., which increases the intestinal peristalsis.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

It is an excellent laxative to counteract the constipating effect of ferrous sulphate in cases of **anæmia.**

Caution.—If large doses of magnesia or magnesium carbonate are given for any length of time, concretions of ammonio-magnesium phosphate are apt to form in the bowel, leading to intestinal obstruction, peritonitis, perforation and death. Care must therefore be taken to watch the patients who are taking this medicine regularly. If a moderate degree of concretion is diagnosed, full doses of vinegar deserve a trial.

Prescribing hints.—Epsom salts are generally given in mixtures. The nauseous taste can very well be covered by liquorice or choloroform. To prevent their griping properties aromatics or carminatives should be combined with them. The carbonates and the light and heavy magnesia are generally administered in **pills, cachets** or **lozenges.** When in solution they are best given in the form of Mist. Alba. The heavy magnesia sometimes becomes aggregated into a solid mass when ordered in a mixture.

MALTUM. Malt.

(Non-official).

N. O. *Graminaceæ.*

Syn.—*Byne.*

Source.—The seeds of common barley, *Hordeum distichum*, caused to enter into an incipient stage of germination and then dried.

Characters.—A brownish powder.

Composition.—It contains the ferment *diastase*, which can convert starch into dextrin and maltose.

Action.—Assists carbohydrate digestion.

Dose.—1 to 2 drs.

Non-Official Preparations.

1. **Extractum Malti.** *Syn.*—*Maltine.*—A syrupy yellowish brown liquid, made by mixing malt with tepid water and evaporating below 131° F. Consists chiefly of dextrin and maltose. Can be obtained in a large number of combinations, *i.e.* with codliver oil, hypophosphites, iron, quinine, &c. Valuable as a restorative, especially in cases where the digestion is weak. *Dose.*—1 to 4 drs.

2. **Extractum Malti Liquidum.** *Syn.*—*Bynin.*—Similar to the above but concentrated in vacuo to prevent decomposition of the diastase, and then 7 p.c. of alcohol added. *Dose.*—1 to 4 drs.

3. **Bynin Amara.**—A combination of Bynin with the phosphates of iron, quinine and strychnine. It is one quarter the strength of Easton's Syrup. *Dose.*—1 to 4 drs.

4. **Bynol.**—A combination of Bynin and Ol. Morrhuæ.

5. **Extractum Malti Ferratum.**—Maltine containing 2 p.c. of Iron Pyrophosphate. *Dose.*—1 to 4 drs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

Powdered malt in combination with baked wheaten flower in varying proportions forms most of the popular infants' food. It may also be taken mixed with milk or beer or sprinkled over porridge, but as diastase only acts in an alkaline medium it is best to give malt two hours after a meal. It then acts powerfully in promoting carbo-hydrate digestion.

The various malt extracts are chiefly valuable as foods for persons suffering from *wasting diseases* such as **phthisis**, as they are easily tolerated by the stomach and maltose leads to the formation of fat.

MEL DEPURATUM. Clarified Honey.

Source.—Commercial honey melted in a water-bath, and strained, while hot, through flannel previously moistened with warm water.

Characters.—A viscid, translucent, yellowish liquid, becoming crystalline and opaque. Odour honey-like. Taste sweet. *Impurities.*—Starch, syrup, &c.

Composition.—A mixture of several kinds of sugar, viz.—Cane-sugar, grape-sugar, levulose; also wax, pollen, colouring and odorous matters, &c.

Enters into.—Confectio Piperis, and the

Official Preparations.

1. **Mel Boracis.**—1 in 7 by volume.
2. **Oxymel.**—4 in 5. Expectorant. More as a vehicle. **B.P. Dose.**—1 to 2 drs.
3. **Oxymel Scillæ.**—Expectorant. **B.P. Dose**—½ to 1 dr.

Pharmacology and Therapeutics.

Externally.—Honey is a demulcent and is used as a covering to **boils** and **excoriations**. It is also used as a cosmetic.

Internally.—It is said to increase the secretions of the mouth and throat, and thus acts as a **demulcent**, relieving dryness of the mouth, cough, and difficulty in swallowing. Hence it is used in gargles, cough mixtures and linctuses. It is a **nutrient** and in large doses **laxative**, and is therefore used to open the bowels of infants. Honey makes an excellent vehicle for castor oil and for administation to new-born babes and infants.

MENTHÆ PIPERITÆ OLEUM.

Oil of Peppermint. N.O. *Labiatæ*.

Habitat.—Britain, United States, Japan, &c.

Source.—The oil distilled from fresh flowering peppermint, *Mentha piperita*.

Characters.—Colourless, pale yellow, or greenish-yellow when fresh, becoming darker by age. Odour of the herb. Taste aromatic, followed

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

by a sensation of coldness. Sp. gr. 0·900 to 0·920. *Solubility.*—1 in 4 of alcohol (90 p. c.) *Impurity.*—Dementholised oil of peppermint known as "Menthene."

Composition.—Contains several hydrocarbons ($C_{10}H_{16}$), *menthone* ($C_{10}H_{18}O$) and other bodies, and deposits crystalline peppermint camphor known as *menthol* when exposed to low temperatures. *Japanese oil* contains the largest percentage of menthol, and *American* less. There are all manner of gradations of the English oil.

Action.—Stimulant, antispasmodic, carminative. **B.P. Dose.**—½ to 3 ms. on sugar or pill.

Enters into.—Pil. Rhei Cg., Tr. Chlorof. et Morph. Co., and the

Official Preparations.

1. **Aqua Menthæ Piperitæ.**—1 in 1,000. *Dose.*—1 to 2 ozs., 1 dr. for a child 1 year old.
2. **Spiritus Menthæ Piperitæ.**—1 in 10. **B. P. Dose.**—5 to 20 ms. This is half the strength of that of B.P. 1885.

Non-Official Preparations.

1. **Peppermint Syrup.**—Spt. Menth. pip. 1 dr., in Simple Syrup 1 oz.
2. **Peppermint Lozenge.**

Pharmacology and Therapeutics.

Externally.—The action of the oil of peppermint resembles that of the volatile oils generally, but the sensation of coldness and numbness after a feeling of warmth is more marked. This is due to the contraction of the local blood vessels after a brief stimulation and to the sedative action on the nerves. Hence it is a local **anæsthetic** and is therefore used to allay the pain of **superficial neuralgias** and **herpes zoster.** It is also a powerful **antiseptic,** and employed in **diphtheria.** It relieves the **toothache** due to a carious tooth. The smell of the oil is said to keep off mosquitoes.

Internally.—It has a similar action on the gastric mucous membrane and thus allays **nausea** and **discomfort.** For its powerful antispasmodic and carminative properties, it is often used to relieve **flatulent colic** and **spasmodic pains** of the stomach. It corrects the griping effect of purgatives and covers the nauseous taste of drugs. It is said to reduce the number of white corpuscles in the blood by diminishing the activity of the intestinal absorbents. The writer has heard of its controlling excessive **menstrual flow,** but this requires confirmation.

MENTHÆ VIRIDIS OLEUM.

Oil of Spearmint. N.O. *Labiatæ.*

Syn. I.V.—*Pudinar tel,* Beng. *Pahári pudiná ka tel,* Hind.
Habitat.—Britain, Germany, &c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source and **Characters.**—The oil distilled from fresh flowering spearmint, *Mentha viridis*. Colourless, pale yellow or greenish-yellow when fresh, becoming darker by age. Odour and taste of the herb. Sp. gr. 0·920 to 0·940. *Solubility.*—1 in ½ of absolute alcohol and alcohol 90 p.c.

Composition.—(1) *Carvone*, a stearoptene found in oil of caraway. (2) *Unoxygenated terpenes.*

Action and **Dose.**—The same as of peppermint.

OFFICIAL PREPARATION.

1. **Aqua Menthæ Viridis.**—1 in 1,000. *Dose.*—1 to 2 ozs.; 1 dr. for a child 1 year old.

PHARMACOLOGY AND THERAPEUTICS.

These are similar to those of the oil of peppermint.

MENTHOL. Menthol.

$C_6H_9.OH.CH_3,C_3H_7$.

Syn.—Sometimes called Peppermint Camphor.

Habitat.—China, Japan, United States.

Source.—Obtained by cooling the oil distilled from fresh herb of *Mentha arvensis*, vars. *piperascens et glabrata*, and of *Mentha piperita.*

Characters.—Colourless acicular crystals, or crystalline masses. Odour and flavour of peppermint, producing a sensation of warmth on the tongue, and if inhaled a sensation of coldness. Melting point 107·6. F. *Solubilities.*—Very slightly in water, 4 in 1 of alcohol and 1 in 4 of olive oil.

Action.—Antiseptic, antineuralgic, local anæsthetic.

B.P. Dose.—½ to 2 grs. in pill. Externally as cone or pencil.

OFFICIAL PREPARATION.

1. **Emplastrum Menthol** (altered).—1 in 6¾. Local anodyne.

NON-OFFICIAL PREPARATIONS.

1. **Mentholeate.**—Menthol 200 grs., Oliec acid ½ oz., dissolve by gentle heat in a test tube. In pruritus.
2. **Linimentum Menthol.**—Methol 3, Chloroform 4, Olive oil *q.s.* to 16. In neuralgia sciatica, lumbago and ringworm of the scalp.
3. **Pigmentum Menthol G.H.**—1 to 4 of olive oil. Painted into the larynx or trachea in laryngeal disease or phthisis.
4. **Tr. Menthol Etherea.**—Menthol 1, Purified Ether 8. Applied with a glass brush.
5. **Menthol Spray.**—Menthol 1, Chloroform 10, Ether 16. Local anæsthetic.
6. **Pimenthol** is obtained from American oil melting at 104 F.
7. **Po-ho-yo.**—A Chinese oil of peppermint sold as Japanese drops.
8. **Validol.**—A specialty containing 30 p.c. of menthol in methyl valerianate. A colourless liquid with an agreeable smell and no burning

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

taste. Used in hysteria and neurasthenia. *Dose.*—10 to 15 ms., either in wine or on a lump of sugar.

Pharmacology and Therapeutics.

Externally.—Menthol locally applied causes first stimulation, soon followed by a feeling of coldness, numbness, and **anæsthesia** of the part, and thereby relieving the pain of **neuralgias**, and other superficial pains. This is very well done by either drawing over the skin solid menthol, or by painting it with linimentum menthol, or a liquefied preparation, such as, menthol cum camphor, menthol cum chloral, or by plaster. Any painting near the eyes, causes a free flow of tears from the vapor. During hot months, the B P. plaster liquefies and oozes through calico, or escapes by the edges of the prepared plaster, and therefore it requires hardening. The plaster or liniment is often found useful in **rheumatic** and **pleurodynic pains, lumbago** and **sciatica.** Mentholeate, alcoholic solution (1 in 8), or menthol ointment (5 to 20 grs. in 1 oz. of vaseline or simple ointment), remarkably relieves **pruritus.** The ointment has been found specially useful in **pruritus pudendi et ani.**

Menthol when rubbed up with either thymol, phenol, chloral hydrate, camphor or butyl chloral, forms an oily liquid, which is an excellent remedy for **toothache.** It should be put into the cavity of the carious tooth and covered with a pledget of absorbent cotton.

Menthol is also a powerful **antiseptic** and **aniparasitic.** Its alcoholic solution or liniment has given good results in **ringworm** of the scalp. The painting of an alcoholic or ethereal solution (10 to 50 p c) at times relieves the **inflammation of boils** and **carbuncles.** As a **snuff** (menthol 5 grs. in 1 oz. of starch, talc or oxychloride of bismuth, or along with boric acid 2, and ammon. chloride 3 parts,) it has been found effective in **influenza, hay fever, catarrh** and **ozœna.**

Internally.—The alcoholic solution has been painted in **diphtheria.** The pigment (20 to 30 ms.) has been injected into the larynx for **laryngeal** and **tracheal tubercle** and **bronchiectasis** with good effects. The anæsthetic effect lasts about 24 hours after a few injections. Menthol 1 gr. in olive oil 1 oz. has been usefully injected for thread worms. It is rarely employed internally, except occasionally as a corrigens of griping purgative pills.

MEZEREI CORTEX.

Mezereon Bark. N. O. *Thymelaceæ.*

Habitat.—Mountainous countries of Europe, the Punjab and the Himalayas.

Source.—The dried bark of *Daphne mezereum*, *Daphne laureola*, or of *Daphne gnidium.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Long, thin, flattened strips or quills, tough and fibrous. Externally brown, internally whitish and silky. Inodorous. Taste acrid burning.

Composition.—(1) *Resin*, acrid. (2) *Mezereinic acid.* (3) *fixed oil*, inert. (4) *Daphnin*, a glucoside.

Action.—Rubefacient, vesicant, stimulant, diaphoretic and diuretic.

Enters into.—Liq. Sarsæ Co. Conc. (*q. v.*).

NON-OFFICIAL PREPARATION.

1. **Ext. Mezerei Æthereum. B.P. 1885.**—Used in making Lin. Sinapis Co. B.P. 1885.

PHARMACOLOGY AND THERAPEUTICS.

Mezereon bark is a powerful **local irritant**, like mustard, producing first **rubefaction** then **vesication**. Lin. Sinapis Co. of B.P. 1885 which contains the ethereal extract, is yet used in acute **bronchitis** and **pneumonia**. Internally, it acts in small doses as a stimulant, diaphoretic and diuretic, and is used in rheumatism and syphilis in the form of Liq. Sarsæ Co. Conc. It has never been used alone, and its efficacy is open to doubt. In large doses it is an irritant poison.

MORPHINA.

See Opium.

MORRHUÆ OLEUM.

Cod-liver Oil. N. O. *Teleostei.*

Syn. I. V.—*Mâcher tel*, Beng. *Machli kâ tel*, Hind.

Habitat.—Coasts of Norway, Newfoundland, France, England, Labrador.

Source.—The oil extracted from the fresh liver of the cod, *Gadus morrhua* by the application of a temperature not exceeding 180°F.; and from which solid fat has been separated by filtration at about 23°F.

Characters.—Pale yellow, with a slight fishy but not rancid odour, Sp. gr. 0·920 to 0·932. *Solubility.*—Readily in ether and chloroform, and slightly in alcohol (90 p.c.).

Composition.—(1) *Olein* 72 p.c. (2) *acetin* ($C_9H_{14}O_6$). (3) *Palmitin.* (4) *Stearin.* (5) Free *fatty acids* (oleic, palmitic, stearic), (6) *Trimethylamine.* (7) Traces of *iodine*, *bromine*, *sodium*, *calcium*, *potassium*, *iron*, *phosphoric* and *sulphuric acids*, &c. (8) Several *alkaloids*, such as, morrhuine, aselline, butyl-amine, amylamine and hexyl-amines, &c. (9) *Biliary constituents*, such as *cholesterin.* (10) *Resinous matter.* (11) *Colouring matter.*

Rancidity is due to the formation of *hydroxy-acids*, and not to the breaking up of *glycerides.* **B.P. Dose.**—1 to 4 drs.

NON-OFFICIAL PREPARATIONS.

1. **Cod-liver Oil Capsules.**—½ to 1 dr. in each. *Dose.*—1, 2 or more.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. **Emulsio Olei Morrhuæ. B.P.C.**—1 in 2. Cod-liver oil 8 ozs., Yolks of 2 eggs, Pulv. Tragacanth. 16 grs., Elix. Glusidi 1 dr., Tr. Benzoin (simple) 1 dr., Spt. Chloroform 4 drs., Essential Oil of Bitter Almonds 8 ms., distilled Water *q.s.* to 16 ozs. Triturate tragacanth with a little oil, add yolks and stir, gradually adding water and oil alternately; transfer to a pint bottle, add the remainder previously mixed, shake well and make up to 16 ozs. *Dose.*—2 to 8 drs.

3. **Emulsio Olei Morrh. et Hypophosphitum.**—Contains calcium and sodium hypophosphites 1 p.c. each. *Dose.*—2 to 8 drs.

4. **Morrhuol.** *Syn.—Ext. Olei Morrhuæ Alcohol.*—A bitter, aromatic, yellowish-brown liquid, prepared by the evaporation of the alcoholic solution of cod-liver oil, containing the alkaloids and aromatic principles of the oil. A good substitute for the oil in cases when it is not tolerated. Each capsule contains 3 ms. which is equal to 80 ms. of cod-liver oil. *Dose.*—1 or more.

5. **Pangaduine.**—In solid crystals, representing the whole of the alkaloids contained in the cod-liver oil. It increases the flow and density of urine, and helps elimination of urea. In gout, gravel, phthisis, neurasthenia. *Dose.*—5 grs., which is equal to 5 ozs. of oil, daily.

6. **Lofotol.**—An effervescent preparation of Codliver oil charged with carbon dioxide. Said to be less prone to rancidity than the ordinary oil. Very palatable and easily digested.

7. **Dermosapol.**—A superfatted soap containing 50 p.c. of Codliver oil in combination with peruvian balsam, glycerin, lanoline and an alkali. May be medicated in various ways.

PHARMACOLOGY.

Externally.—Cod-liver oil is a bland unirritating oil, freely absorbed through the skin.

Internally. **Gastro-intestinal tract.**—On account of its fishy, unpleasant smell, many patients cannot retain it, and with some it creates indigestion. In large doses, it may cause diarrhœa, the oil being expelled in the stools. Experimentally, it has been proved that cod-liver oil is more rapidly absorbed than other oils, fats, butter, ghee, &c. It is also better digested, because the free acids it contains no doubt facilitate its emulsification and saponification, by its admixture with the alkaline secretions of the pancreas, the intestinal glands and bile. Along with the cod-liver oil, other oils and nitrogeneous elements of the food, are helped in their digestion, and are also better absorbed by the lacteals. Thus, it acts as a general **digestive agent**. Bile no doubt plays an important part in the absorption of all fats and oils, for it has been found from experiments that fats pass with difficulty through moist animal membranes, but readily through them if moistened with bile. The biliary constituents contained in the oil itself also aid its absorption, but many authorities deny their presence, saying that they are insoluble in oil.

Blood.—Cod-liver oil is said to enrich the quality of the blood especially that of the corpuscles, which are augmented. This is

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

due to the absorption of the fatty principles and other constituents of the oil. Therefore it is a **hæmatinic.**

Tissues and metabolism.—Cod-liver oil is not only quickly absorbed but readily assimilated, imparting more nutrition to the cells than can ordinarily be done by other oils and fats. It is therefore reckoned more as a **food** than a medicine. Iodine, bromine, phosphorus, &c., perform their share when administration is continued for a long period but it must be understood that the specific action of cod-liver oil depends more upon its fatty constituents than on the extraneous constituents it contains. It also oxidises readily in the tissues, checks the wastage of other nitrogenous elements, and promotes healthy cell-formation; this is the explanation of the increase of **body-weight** during a course of cod-liver oil treatment. In fact the superiority of codliver oil over other oily and fatty substances depends chiefly upon (1) rapid absorption, (2) quick assimilation, (3) ready oxidation, (4) higher nutritive value, and (5) its powerful effect on cell-growth and metabolism. Therefore, many morbid conditions of the system due to faulty assimilation and defective oxidation are slowly removed by it; hence it is an excellent **alterative tonic.**

Elimination.—It is mostly absorbed, a little is expelled in the fæces. Some of the acid ingredients escaping through the skin may produce a sort of acne.

THERAPEUTICS.

Externally.—If the oil is not retained, or creates indigestion or diarrhœa, inunction of oil is a capital method for introducing it into the system. 2 to 4 drs. rubbed into the skin after a hot-bath, or a particular part after washing it with soap and hot water, give at times very striking results. Wasting diseases of children are specially benefited by this method, the only drawback being its objectionable odour.

Internally.—It is of signal service in all sorts of chronic wasting diseases dependent on malnutrition and malassimilation, especially so in **scrofulous disease** in its various forms, and **phthisis, rickets, caries of bones, chronic joint disease,** *e.g.*, rheumatic or scrofulous arthritis, long **continued suppuration, chronic eczema, lupus, psoriasis, tertiary syphilis, chronic bronchitis, whooping cough, emphysema, asthma, general debility** due to under-feeding, exhaustion, overwork, &c., **convalescence** from acute illness, *e.g.*, pneumonia, &c., are benefited under its course. Some authorities even go so far as to assert that it cures some forms of phthisis. As a nourisher and restorer of nerve cells, it has been found to be of great value in many **nervous disorders** due to old age, debility or exhaustion, such as mental irritability, despondency, neurasthenia, hysteria, chorea, neuralgia, headache, &c. Sometimes constipation yields to it. Many of the above diseases are

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

remarkably benefited by the combination with iron and iodine or quinine and hypophosphites.

Contra-indications.—Indigestion, nausea, vomiting, eructation, diarrhœa, gastric catarrh, high temperature, severe hæmoptysis primary or induced, contra-indicate its use.

Dose and mode of administration.—It should always be **begun in small doses**, say 1 dr., unless it is desired that the surplus quantity would act as a mild laxative. It should be gradually increased to 4 drs. and **always given after food**, twice or thrice daily. In rare instances, the maximum dose requires to be increased. In the beginning, say for one week, it is a good plan to give only one dose a day preferably after dinner.

Brown oil is superior to pale oil ; because it contains more fatty acids, but its disagreeable smell and taste are a drawback. Children generally can take it better, or soon get accustomed to its taste, but in the majority of cases a pleasant combination becomes necessary. Saponification should be avoided on account of the chemical changes that would occur with the fatty acids contained in the form of glycerides, in fact, the great *point is to preserve these acids absolutely unchanged.* Hence, **emulsification**, as in Emulsio Olei Morrhuæ. B.P.C., is only to be recommended. It can be extemporaneously emulsified by gum acacia or tragacanth, sweetened by glycerin and flavoured by lemon or bitter almond oils. It can also be given in **flexible capsules**, mixed with isinglass, jelly, or still better with extract of malt. Some patients prefer to take it on milk, coffee, wine, or orange juice. A pinch of salt placed on the tongue, a cut lemon sucked, a piece of fresh ginger well chewed and some of the juice swallowed, before and after the dose, effectively remove the nauseous taste in many instances. To help its emulsification as well as to stimulate the pancreatic secretion, purified ether (10 to 20 ms.) is sometimes combined with it.

If the oil disagrees, morrhuol or wine of cod-liver oil, which is but a solution of morrhuol may be given instead. When no method can be found by which the oil can be retained and digested, **inunction** is the last resource (see page 449). It is sometimes injected subcutaneously or any of the following substitutes (q.v.) may be tried :—**Maltolivine, Marrubin, Oleum olivæ c. Acido oleico, Mistura olei olivæ, Virol.**

MOSCHUS. Musk.

N. O. *Ruminantia.*

Syn. I. V.—*Mrigandvi, Kasturi*, Beng., Sans. *Kasturi*, Hind.

Habitat.—Central Asia, Thibet, exported to Europe from Bengal and China.

Source.—The dried secretion from the preputial follicles of *Moschus moschiferus.*

Characters.—In irregular, reddish-brown or reddish-black somewhat unctuous grains. Odour characteristic, persistent, taste somewhat bitter. Contained in an oval sac, 1½ to 2 in. in diameter, nearly smooth on one side, covered on the other or outer side by brownish-yellow or greyish adpressed bristle-like hairs concentrically arranged around a central orifice.

Impurities.—Dried blood, catechu, earthy matter, cinnabar, pieces of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

leather, &c. The sac is so ingeniously filled and stitched that the contents cannot be made out unless it is cut open.

Tests.—Should be free from earthy matters, and on incineration should not yield more than 8 p.c. of ash. There is considerable moisture amounting to about 36 p.c. The spurious sac has no aperture and the hairs are not so well arranged circularly, and there is no trace of penis, which is found in every genuine pod.

Composition.—(1) An *aromatic principle* with unknown composition; (2) *Inactive substances*, such as fixed oils, fats, salts, &c. Complete drying removes the odour, but it returns when moistened with water.

Action.—Stimulant and antispasmodic. **B.P. Dose.**—5 to 10 grs. in pill or emulsion.

Non-Official Preparations.

1. **Mistura Moschi.**—Musk 9 grs., Acacia 9 grs., Sugar 9 grs., Rose water 1 oz. *Dose.*—½ to 2 ounces or more.
2. **Tr. Moschi.**—Musk 6 grs., Alcohol (90 p.c.) 1 oz. Digest for 7 days, and strain. *Dose.*—½ to 1 dr.

Pharmacology and Therapeutics.

Internally.—Musk is known to be a powerful **diffusible stimulant** to the **cardiac, respiratory** and **nervous** systems. Whether this action is a **reflex** stimulation from the nose, mouth and stomach, or is due to **direct** influence on the cardiac and respiratory centres, and the cells of the brain, is not known; perhaps to both. In moderate doses, it may cause giddiness, heaviness of the head, headache, dryness of the gullet, eructations, sometimes nausea, followed by sleepiness or faintness. In large doses, it may produce tremor and convulsions. It is an **antispasmodic**. It is excreted in the urine and sweat, and the unabsorbed portion passes out with the stools, which are imbued with its odour.

Musk is chiefly used to sustain and strengthen a failing heart and pulse in **adynamic, febrile** and **other diseases**, such as low **remittent, typhus**, and **typhoid** fevers, **pneumonia**, &c. It is a mistake to use it as a last resource, when the vital powers are fast fading away. To be of use, the dose is to be repeated frequently, as it is soon excreted. Trousseau, extols it in **drunkard's pneumonia**, and Wood recommends it in **delirium tremens**. Ten drops of the tincture every ½ hour for 4 to 6 doses, remove **cardiac dyspnœa**, and induce sleep. It was employed in melancholia, hysteria, chorea, whooping-cough and epilepsy, but is scarcely used now. The tincture has been found by the writer to check some forms of hiccough, and in combination with strophanthus, to remove palpitation of hysterical subjects.

It is best given in a **mixture**, as the mistura moschi, **pill** or **linctus** made with camphor and honey.

It is the only stimulant used by the native *Kavirajes* who practise the ancient Hindu System of medicine.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

MYLABRIS. Mylabris.

N.O. *Coleoptera.* (*Ind. and Col. Addendum*).

Syn.—The Telini Fly. **Syn. I.V.**—*Telini-pokâ;* Beng. *Telini-makhi*, Hind.

Habitat.—India, Eastern and African Colonies.

Source.—The dried beetle of *Mylabris phalerata.*

Characters.—About 1 in. long, ⅜ in. wide. The elytra long, black, with two broad zig-zag, orange coloured transverse bands, and a large orange-coloured spot at the base. A pair of brown membranous wings.

Composition.—*Cantharidin*, active principle.

Official Preparations.

1. **Acetum Mylabridis.**—1 in 5 of Glacial Acetic Acid and 5 of Water.
2. **Emplastrum Calefaciens Mylabridis.**—See page 22. Substitute Mylabris for Cantharis.
3. **Emplastrum Mylabridis.**—See page 22. Substitute Mylabris for Cantharis.
4. **Liquor Epispasticus Mylabridis.**—1 in 2 of Acetic Ether. See page 33 Substitute Mylabris for Cantharis.
5. **Unguentum Mylabridis.**—1 in 10 of Benzoated lard. See page 58. Substitute Mylabris for Cantharis.

Pharmacology and Therapeutics.

The action and uses of mylabris are precisely the same as those given for cantharis. (See p. 310.)

MYROBALANUM.

Myrobalan.

N.O. *Combritaceæ.* (*Ind. and Col. Addendum.*)

Syn.—Chebulic Myrobalans. **Syn. I.V.**—*Haritaki*, Beng. *Hara*, Hind. *Haritaki, Abhaya*, Sans.

Habitat.—India and Eastern Colonies.

Source.—The dried immature fruits of *Terminalia chebula.*

Characters.—About ½ to ¾ in. long, ⅜ in. wide, ovoid or fusiform like an olive, but shrivelled longitudinally ; black, solid and brittle, with shining fracture. Taste very astringent.

Composition.—(1) *Gallo-tannic acid*, about 25 p.c. (2) *Gallic acid.* (3) resin, &c.

There are two varieties of *Terminalia chebula* met with in the bazars ; one known as *jangi haritaki*, the unripe but dried fruits of the above named plant. The other variety is *haritaki* so common in the bazars, is the dried mature fruit of the same plant.

Action.—Astringent, alterative and tonic. **B.P. Dose.**—½ to 1 dr.

Official Preparations.

1. **Unguentum Myrobalani.**—1 in 4 of Benzoated lard.
2. **Unguentum Myrobalani c. Opio.**—Myrobalan ointment 925, Opium in powder 75.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

Internally.—These fruits were highly extolled by the ancient Hindu physicians as powerful astringents, stomachics, tonics and alteratives. In olden times they held a prominent place amongst the masticatories and even now many habitually use them with no troubles to the organs of mastication. The powdered fruits form an important ingredient of tooth powder, which when regularly used prevents the teeth from premature fall and decay. It is also a valuable remedy for **spongy and ulcerated gums**, and acts as a gentle **purgative**. One or two fruits taken daily at bed time keep the bowels very regular, giving one or two evacuations in the morning. On account of the astringent and aperient properties, myrobalans, especially of the smaller variety, (*Jangi haritaki*) are very useful in **diarrhœa** and **dysentery**. Owing to the large amount of tannin which they contain, they are of great service as **lotions** and **injections** and may be substituted with advantage for **Galls**. They can also be chewed with benefit to remove the after taste of nauseous drugs. *Jangi haritaki* fried in a little good *ghee*, and then soaked in the sun for about a week with lime juice and black salt, is a well-known domestic remedy.

MYRISTICA. Nutmeg.

N.O. *Myristicaceæ.*

Syn. I. V.—*Jaiphal*, Beng. *Jaiphal, Jati, Jaintri*, Hind.

Habitat.—Banda islands of the Malayan Archipelago; Malabar and Ceylon.

Source.—The dried seed of *Myristica fragrans*, divested of its testa.

Characters.—Ovoid, about 1 in. long. Externally greyish-brown, with reticulated furrows. Internally greyish-red, marbled with brownish-red veins. Odour strong, aromatic. Taste aromatic, warm, bitter.

Composition.—(1) Fixed or Concrete oil, 30 p.c. (2) *Volatile oil*, 4 p.c. (3) Starch, &c.

Action.—Stimulant, carminative, narcotic. *Dose.*—5 to 20 grs.

Enters into.—Pulv. Catechu Co., Pulv. Cretæ Aromat., Spt. Armoraciæ Co., Tr. Lavend. Co.

OLEUM MYRISTICÆ.

Oil of Nutmeg.

Source and Characters.—A pale-yellow oil, distilled from the nutmeg, having the odour and taste of nutmeg. *Solubility.*—1 in 4½ of alcohol (90 p.c.).

Composition.—(1) *Myristicin*, a terpene. (2) *Myristicol.*

B.P. Dose.—½ to 3 ms. on sugar or in pill

Enters into.—Pil. Aloes Soc., Spt. Ammon. Aromat., Tr. Guaiaci Ammon., Tr. Valerian. Ammon., and the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

OFFICIAL PREPARATION.

1. **Spiritus Myristicæ** (altered).—1 in 10. **B.P. Dose.**—5 to 20 ms. *Enters into.*—Mist. Ferri Co.

NON-OFFICIAL PREPARATION.

1. **Oleum Myristicæ Expressum.** *Syn.*—*Adeps Myristicæ.*—A concrete oil obtained by expression and heat. Diluted with a bland oil or soap liniment, it is a useful application to sprains, rheumatism, paralysis, &c.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The volatile and the fixed oils are used for perfuming pomades and lotions for the hair, and diluted with olive oil or soap-liniment as an embrocation in **chronic rheumatism.** The expressed oil is said to possess antiseptic and antiparasitic properties. Nutmeg made into a paste is sometimes used by the natives to remove headache and neuralgia.

Internally—For its agreeable aroma it is used in cooking. Both the kernel and the volatile oil are **gastric stimulants,** increasing the flow of gastric juice, and **carminatives,** expelling intestinal flatus; hence they can be used in **dyspepsia, cramps** and **flatulence.** The valatile oil relieves toothache, and the kernel is chewed to remove fœtor of breath. An infusion of nutmeg is said to allay the thirst of cholera patients. In large doses, it acts as a **powerful narcotic,** causing giddiness, vertigo and coma, symptoms resembling those that follow poisonous doses of camphor.

MYRRHA. Myrrh.

N. O. *Burseraceæ.*

Syn. I. V.—*Gandharasha, gandhabhal, Bol,* Beng. *Bola,* Sans. *Bol,* Hind.

Habitat.—Somali Land, Arabia Felix, and Western India.

Source.—A gum resin obtained from the stem of *Balsamodendron myrrha,* and probably other species.

Characters.—In rounded or irregular tears or masses of agglutinated tears, varying in size, reddish-brown or reddish-yellow, dry, brittle, covered with a fine powder; fractured surface irregular, somewhat translucent, brown, oily, with whitish marks. Odour agreeable, aromatic. Taste aromatic, bitter, acrid. Partly soluble in water, resin soluble in alcohol. *Impurities.*—Resins and gum-resins, false myrrh. Bombay is the chief myrrh market. The best quality is the *Karam* myrrh.

Composition.—(1) *Gum,* 60 p. c. (1) *Myrrhin,* a resin 23 p. c. (3) *Myrrhol,* a volatile oil. (4) A bitter principle.

Action.—Stomachic, carminative, emmenagogue. *Dose.*—10 to 30 grs.

Enters into.—Decoct. Aloes Co., Mist. Ferri Co., Pil. Galbani Co., Pil. Rhei Co. and the

OFFICIAL PREPARATIONS.

1. **Pilula Aloes et Myrrhæ.**—(See Aloes, p. 220.)
2. **Tinctura Myrrhæ.**—1 in 5. **B.P. Dose.**—½ to 1 dr. in emulsion.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparations.

1. **Gargarisma Myrrhæ.**—Tr. Myrrh. 1, Honey 1, Inf. Rosæ 18 ; mix.
2. **Tr. Myrrhæ et Boracis.**—See Borax, page 178.

Pharmacology.

Externally.—Like other oleo-resins, locally, myrrh is a mild **disinfectant, stimulant** and **alterative** to the ulcerated and mucous surfaces.

Internally. **Gastro-intestinal tract.**—The same action is noticed in the mouth, throat, stomach and bowels. It promotes appetite, excites gastric secretion and peristalsis of the stomach and intestines, and is therefore a **stomachic** and **carminative.**

Blood.—It **increases** the number of **leucocytes,** perhaps by stimulating lacteal activity. It stimulates phagocytosis.

Elimination.—It is excreted by the mucous membranes, especially those of the **respiratory** and **genito-urinary,** tracts, which it stimulates and disinfects ; hence it is a **stimulant expectorant, emmenagogue,** and **uterine stimulant.**

Therapeutics.

Externally.—Myrrh is sometimes used by the natives of India as a dressing for foul ulcers, or dissolved in human milk as a collyrium for purulent conjunctivitis.

Internally.—Myrrh makes a capital mouth-wash (Gargarisma Myrrh.) for **aphthous and ulcerated** tongue, **relaxed throat** and **spongy gums.** Its efficacy is increased if combined with borax, as in Tr. Myrrh. et Boracis. For **receded** and **ulcerated gums,** Tr. Myrrhæ and Tr. Iodi make a superior preparation. For its stomachic and carminative properties, it is often used as an **adjunct** of purgatives in **dyspepsia, constipation, chlorosis,** &c. Combined with iron, it is very effective in **anæmia.** As a disinfecting expectorant, it is occasionally given in **chronic bronchitis** and **bronchiectasis,** and as a stimulant alterative to the mucous membrane, in **cystitis** and **leucorrhœa.** For its emmenagogue property it is largely prescribed in **amenorrhœa,** in conjunction with aloes and iron. Some however doubt its emmenagogue action. Recently, Dr. Stroll (Munich) has used the tincture in **diphtheria** with marvellous success. He treated 180 cases with only 1 death by Tr. myrrh. 1, glycerin 2, water 47 parts.

NAPHTHOL. Beta-Naphthol.

$C_{10}H_{72}OH.$

Syn.—Naphthol U.S.P. Beta-mono-hydroxy-naphthaline.

Source.—Prepared from naphthaline-sulphonic acid.

Characters.—White crystalline lamin[illegible] or powder, with phenol-like

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

odour, and pungent taste. *Solubility.*—Nearly insoluble in water, 1 in 2 of alcohol (90 p. c.), 1 in 12 of olive oil, 1 in 40 of glycerin.

Action.—Powerful antiseptic and intestinal disinfectant.

B.P. Dose.—3 to 10 grs. in cachets or pills.

NON-OFFICIAL PREPARATIONS.

1. **Alpha-Naphthol.** *Syn.—Ortho-Naphthol.*—Has 3 times the antiseptic property of *B*-Naphthol. More soluble, less toxic, but more irritant. As an intestinal wash, 5 grs. in 1 quart. of water. Shoemaker found it useful in gonorrhœa and gleet.

2. **Acidum Oxynaphtholicum.** *Syn.—Naphthol Carbonic Acid.*—In reddish masses. The ointment (10 p.c.) used in scabies.

3. **Alphol.**—A salicylate of *a*-naphthol ether. Whitish soluble powder. Acts like salol and betol in articular rheumatism and cystitis.

4. **Asaprol.** *Syn.—Abrastol.*—Obtained by acting on *B*-naphthol-sulphonic acid with calcium carbonate. Acts like sodium salicylate in rheumatism and neuralgia, and as an antiseptic in dyspepsia. Praised as an intestinal hæmostatic. It is a test for albumen in urine. The test solution is made by adding 1 part of strong hydrochloric acid to 10 of a 10 p.c. watery solution of Asaprol. 10 drops of this to 1 dr. of urine precipitates albumen, albumoses and peptones. All other precipitates are *dissolved* on boiling, *except* that of albumen.

5. **Benzonaphthol.** *Syn.—Benzoyl-Napthol.*—A whitish tasteless insoluble powder. Intestinal antiseptic and diuretic, splitting up into *B*-naphthol and benzoic acid in the intestines. In dyspepsia and typhoid fever. *Dose.*—5 to 15 grs.

6. **Betol** *Syn.—Naphthalol, Napthosalol.*—A salicylate of *B*-naphthol-ether, in tasteless white crystals, insoluble in water. Splits up into salicylic acid and naphthol in the system. Used in rheumatism and cystitis. *Dose.*—3 to 8 grs.

7. **Epicarin.**—A condensation product of *B*-naphthol and cresolic acid. A 10 p.c. ointment useful in psoriasis and scabies—also in chilblains.

8. **Lactol.**—A *B*-naphthol lactate. More soluble. Acts like benzonaphthol.

9. **Microcidine.**—Obtained by fusing *B*-naphthol with caustic soda. Whitish, non-toxic soluble powder. Used for lotions and dressings.

10. **Naphthalene.** *Syn.—Naphthalin.*—A coal tar derivative in white rhomboid crystals insoluble in water. A powerful antiseptic and germicide. Moulded into sticks or blocks, it is sold as *Alabastrine*, moth preventive, *Camphylene*, a stable and urinal disinfectant, &c. Is used externally and internally. As an intestinal disinfectant in dysentery, catarrhal, typhoid and phthisical diarrhœa. 10 to 20 p c. solution in oil cures scabies.

11. **Naphthol c. Camphora.**—*B*-naphthol 1, Camphor 2. A viscid liquid, miscible with oil. A powerful non-toxic antiseptic for wounds and diphtheritic membrane. An intra-pulmonary injection was given with benefit in 3 out of 4 cases.

12. **Quinaphthol.**—Quinine-Beta-naphthol-sulphate. Yellow crystals sparingly soluble in water. A harmless intestinal antiseptic in typhoid fever. *Dose.*—8 to 10 grs.

13. **Ung. Naphthol.** *Syn.—Kaposi's ointment.*—*B*-naphthol 1 dr., lard 1 oz., mist.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

14. **Ung. Naphtholi Co.**—Naphthol 15, Lard 100, Green Soap 50, prepared chalk 10. An improvement upon Kaposi's ointment.

Pharmacology and Therapeutics.

Naphthol without a prefix should mean *B*-naphthol not *a*-naphthol. It is a powerful **antiseptic** and **disinfectant**, both externally and internally. In **scabies, ringworm, psoriasis** and **chronic eczema**, the ointment having a less unpleasant odour may be used with success instead of tar, which it resembles in action. Internally it is chiefly used for its gastro-intestinal antiseptic property in **dyspepsia, pyloric obstruction, diarrhœa, dysentery, cholera** and **typhoid diarrhœa**, especially in the last. The action on the gastro-intestinal canal is local. Most of the drug is excreted in the fæces, only a little being absorbed. If it is largely absorbed, it may cause vomiting, insensibility, nephritis or hæmaturia. It is found in the urine unaltered. It may be given in *cachets* or *pills*, or as an *emulsion* dissolved in *oil*. The pills may be coated with keratin.

Benzo-naphthol is a very valuable remedy in the treatment of **psilosis** and also, in combination with resorcin or bismuth salicylate, in the **inflammatory diarrhœa of children.**

NUX VOMICA. Nux Vomica.

N.O. *Loganiaceæ*.

Syn.—Poison-Nut. **Syn I. V.**—*Kuchila*, Beng., Hind.

Habitat.—East Indies (India, Ceylon, Cochin China).

Source—The dried ripe seeds of *Strychnos nux vomica*.

Characters.—Disc-shaped, ¾ to 1 in. in diameter, ¼ in. thick, concavo-convex or flat; rounded or somewhat acute at the margin, where there is a small prominence from which a raised line passes to the central hilum. Surface ash-grey covered with short satiny hairs. Endosperm large, horny. Cotyledons small, leafy. Taste intensely bitter. No odour. The *St. Ignatius' Beans* are the seeds of *Strychnos Ignatia*, they are olive-shaped, and contain more strychnine.

Identification.—It resembles no other drug in the B. P. The satiny appearance, the colour, and the flat and circular button-like shape will at once distinguish it.

Composition.—(1) *Strychnine*, 0.2 to 0.5 p. c. varying in different seeds. (2) *Brucine*, 0.5 to 1 p. c. (3) *Igasuric acid*, with which strychnine and brucine are united. (4) *Loganin* a glucoside. (5) *Igasurine*, another alkaloid like the other two. (6) Fat and sugar.

Action.—General tonic and spinal stimulant.

B. P. Dose.—1 to 4 grs. in powder or pill.

Official Preparations.

1. **Extractum Nucis Vomicæ** (altered and standardized).—Strychnine 5 p. c. Has ⅔ the alkaloidal strength of the extract of B.P. 1885. **B.P. Dose.**—¼ to 1 gr. in pill.

2. **Extractum Nucis Vomicæ Liquidum** (new).—Strychnine 1½ grs. in 110 ms. **B.P. Dose.**—1 to 3 ms.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

3. **Tinctura Nucis Vomicæ** (altered).—Strychnine ¼ gr. in 110ms. **B.P. Dose.**—5 to 15 ms.

NON-OFFICIAL PREPARATIONS.

1. **Inf. Nucis Vomicæ** (Ind. Pharm).—Bruised seeds 2 drs., boiling water 2 ozs., infuse 1 hour. A valuable bitter tonic, to be used with caution. *Dose.*—½ oz., to be gradually increased to 1 oz.

2. **Brucine.**—In whitish, bitter, acicular crystals, resembling strychnine in pharmacology and therapeutics, but being weaker and eliminated sooner. It greatly increases the **reflex** activity of the spinal centres. Recommended in epilepsy in $\frac{1}{50}$ gr. dose, gradually increased to ½ gr. It is difficult to get it free from Strychnine. May be given in solution in water, and spirit, or in pill.

STRYCHNINA. Strychnine.

$C_{21}H_{22}N_2O_2$.

Source.—An alkaloid obtained from the dried ripe seeds of strychnos nux-vomica and other varieties of Strychnos.

Characters.—Colourless, inodorous, trimetric prisms. *Solubility.*—1 in 150 of cold water, but according to Squire 1 in 6000 to 8000 of water, 1 in 160 of alcohol (90 p.c.); 1 in 6 of chloroform. *Impurities.*—Brucine and mineral matter.

Taste.—(1) Watery solution is intensely bitter. (2) Sulphuric acid forms a colourless solution, which on addition of potassium bichromate acquires a violet hue speedily passing through red to yellow. (3) Sulphuric acid containing $\frac{1}{20000}$ part of potassium permanganas gives a violet colour with a minute particle of strychnine. (4) Not coloured by nitric acid (absence of brucine, which is coloured blood-red).

Resembles.—Larger forms of crystals of salicylic acid but can be detected by the above tests and by the general appearance.

B.P. Dose.—$\frac{1}{60}$ to $\frac{1}{15}$ gr. in pill, well triturated with milk sugar, or preferably in solution.

Enters into.—Syr. Ferri Phosph. c. Quin. et Strychnina. (see page 398).

STRYCHNINÆ HYDROCHLORIDUM.

Strychnine Hydrochloride. $C_{21}H_{22}N_2O_2$ HCl, $2H_2O$.

Syn. B. P. 1885.—Hydrochlorate of strychnine.

Source and characters.—Obtained from nux vomica and other species of strychnos. Small colourless, trimetric prisms, which effloresce in the air, very bitter. *Solubility.*—1 in 35 of water, or 1 in 60 of alcohol. *Impurities*—Sulphates.

OFFICIAL PREPARATION.

1. **Liquor Strychninæ Hydrochloridi.**—1 gr. in 110 ms. **B. P. Dose.**—2 to 8 ms. *i. e.* $\frac{1}{55}$ to $\frac{1}{14}$ gr. of strychnine hydrochloride.

NON-OFFICIAL PREPARATIONS OF STRYCHNINE.

2. **Strychninæ Acetas.**—Colourless acicular crystals, imperfectly soluble in water. Alterative, antitubercular. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. **Strychninæ Arsenas.**—Small white acicular crystals, soluble 1 in 29 of water. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

3. **Strychninæ Hydrobromidum.**—White crystals. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

4. **Strychninæ Nitras.**—Hard colourless needles, soluble 1 in 67 of water. Successfully used in nocturnal incontinence of urine, amaurosis, chorea, gastralgia, gastrodynia. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr. Hypodermic solution.—1 gr. in 100 ms. of water, dissolved by gentle heat; *Dose.*—2 to 6 ms.

5. **Strychninæ Phosphas Acidus.**—Shining acicular crystals. Soluble 1 in 31·5 of water. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

6. **Strychninæ Sulphas.**—Prismatic. Soluble 1 in 62 of water. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

7. **Strychninæ Sulphas acidus.**—Silky acicular crystals. Soluble 1 in 42 of water. *Dose.*—$\frac{1}{60}$ to $\frac{1}{15}$ gr.

8. **Hypodermic Tablets.**—Contain $\frac{1}{100}$, $\frac{1}{30}$, $\frac{1}{60}$ gr. each of the sulphate.

9. **Strychninæ Hypophosphis** (Merck).—White powder, soluble in water. In tuberculosis and wasting diseases. *Dose.*—$\frac{1}{30}$ to $\frac{1}{15}$ gr.

Pharmacology.

Externally.—Strychnine is a powerful **antiseptic**, while brucine is a local anæsthetic.

Internally. **Gastro-intestinal tract.**—Being intensely bitter, both nux vomica and strychnine are typical **stomachics** and **tonics**, increasing the secretion of the gastric juice, and thereby sharpening appetite and promoting digestion like gentian, calumba, &c., but more powerfully. They **increase the peristaltic movements of the intestines**, and may thus act as **purgatives**.

Blood.—Strychnine enters the blood from the mucous membrane or when given hypodermically. It is not yet known what effect it has on the living blood corpuscles, though blood mixed with strychnine and shaken with air contains more oxygen and less carbonic acid.

Heart and circulation.—The heart is **powerfully stimulated** by influencing (*a*) the **cardiac centre**, and (*b*) the **cardiac muscle**. In minute doses it strengthens the heart-beats. The **blood-pressure is greatly raised**, partly by (*a*) direct stimulation of the vaso-motor centre, thus contracting the vessels all over the body; (*b*) by indirect or asphyxial stimulation of the vaso-motor centre, due to the saturation of the blood with carbonic acid; and (*c*) by obstruction to the circulation and increase of peripheral resistance due to muscular spasm. The heart beats for a while after the respiration has stopped, but remains contracted after death.

Respiration.—It powerfully **stimulates the medullary and spinal respiratory centres**, rendering the respiration **deeper and quicker**. The latter becomes so active after the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

administration of strychnine, that if the cord of an animal is cut below the medulla, the respiration is not entirely stopped, as usually happens; again, if the drug is given after the section of the cord, respiration returns. The respiratory muscles participate in the general tetanus, and the patient dies asphyxiated from the rigidity of the thoracic muscles and diaphragm.

Temperature rises slightly during the codvulsions.

Brain.—The convolutions are not affected, the mind remaining clear till the last. In minute doses, it is said to **strengthen** the **mental powers**, and to **sharpen** the **senses** of sight, smell and hearing, perhaps by stimulating the **sensory nerve centres.**

Medulla and cord.—Strychnine excites the three important centres in the medulla, *viz.*—(1) the **respiratory**, (2) the **cardiac** and (3) the **vaso-motor**. In large doses it produces **tetanic convulsions**, which are entirely due to the **great excitability of the motor nerve cells of the spinal cord** and exaggeration of the conductive power of the cord generally. It has been experimentally proved that these convulsions are not caused by stimulation of the cerebrum, the motor and sensory nerve trunks, or the muscles. The **reflex excitability** is heightened so much, that the slightest stimulus, as a breath of air, or a loud sound, is enough to cause spasms.

Nerves and muscles.—The motor nerves and the muscles are unaffected, but in toxic doses the functional activity of the motor nerves is depressed towards the end. This is not due to the exhaustion of the nerve tissue as has been supposed, but to the direct action of the drug on the nerves themselves. In moderate doses its local application stimulates local, motor and sensory nerves.

Genital organs.—In moderate doses, it produces sexual desire, and it is therefore an **aphrodisiac.**

Elimination is very slow, the drug clinging to the viscera, especially the brain, for days together. If the dose, however small, is frequently repeated, it accumulates in the body, hence strychnine is **cumulative.** It is eliminated in the urine, partly unchanged, and partly as a strychnic acid.

Toleration.—Some persons are more tolerant than others. Some of the natives of India are in the habit of taking nux vomica morning and evening with *pan*, commencing with ½ gr. they sometimes increase it to about 20 grs. (an entire nut).

Toxic action.—Within ½ to 1 hour after a large and piosonous dose, the symtoms of poisoning commence. General uneasiness and soreness of the limbs, instantly followed by shooting pains in the back and then down the arms and legs are first observed. Tetanic convulsions of the muscles soon set in, lasting for ½ to 1 minute when they relax, leaving the patient sweating and exhausted. They come on again and again and the intermission gets shorter and shorter as the severity of the symptoms increase. The muscles of the jaw are only affected before death, **not**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

in the beginning. In short, the symptoms of poisoning closely resemble those of tetanus, from which they differ in (1) their rapid development, (2) want of a history of a wound, operation, &c., as in tetanus, (3) complete relaxation between the spasms in strychnine poisoning, wheras in tetanus the muscles of the back and jaw remain rigid between the spasms. (4) Trismus or "lock-jaw" only appears as a late symptom, whereas it is the first symptom in tetanus, (5) death taking place soon, or the symptoms rapidly declining. Half a grain is the smallest dose that has been known to prove fatal.

Antidotes.—Pump before convulsions, or under chloroform after convulsions; apomorphine $\frac{1}{10}$ to $\frac{1}{5}$ gr. subcutaneously, or emetics: charcoal, tannin in large quantities, solution of iodine; potassium bromide (2 drs. to 2 ozs) with chloral hydrate (30 to 60 grs.) repeated if necessary; morphine, alcohol in poisonous doses (Whitla): chloroform or amyl nitrite inhalation, artificial respiration, &c.

Antagonists—Chloral and morphine are not strict antidotes to strychnine as they act on the cerebrum. Gelseminum and calabar been are more suitable.

Methyl and Ethyl compounds of Strychnine and Brucine.—Remarkable results have been obtained by Drs. Fraser and Crum Brown when strychnine and brucine were combined with **methyl** and **ethyl** radicals. These new compounds **lose** their **convulsant** action, which they ordinarily possess when uncombined, and produce **general paralysis** of the body by acting on the ends of the motor nerves, like curare. In poisoning by any of these compounds, the heart continues to beat normally for a long time, and the muscles of the body remain for hours flaccid and contractile. Hence, ethyl and methyl compounds of strychnine and brucine may be injected in strychnine poisoning as antidotes.

THERAPEUTICS.

Externally.—Strychnine is too poisonous to be used on an abraded surface. Mustard oil, in which some nux vomica seeds have been fried, has been used by the writer as a stimulant local embrocation over paralysed muscles.

Internally. **Gastro-intestinal tract.**—Nux vomica and strychnine are highly prized remedies for promoting appetite and digestion in **atonic dyspepsia**, and **weakness of digestion** during convalescence from acute illness, such as fever, pneumonia, bronchitis, &c Tr. nucis vomicæ or liqr strychninæ hyd. and infusion of calumba or infusion of gentian, makes a very efficient prescription for such cases **Acidity, heartburn,** or **flatulence** is frequently relieved if the tincture is given ½ hour before food. Strychnine has given satisfactory results in acute and chronic **gastric catarrh**, and **gastralgia** ($\frac{1}{100}$ gr. hypodermically). Because it increases peristalsis, nux vomica has been frequently given as an adjunct to purgatives. Sometimes it corrects **constipation** without the aid of other remedies. Strychnine has been found to cure **prolapsus ani**, especially if associated with constipation.

Heart and circulation.—As a cardiac and vascular stimu-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

lant and tonic, both nux vomica and strychnine are invaluable in **cardiac failure** or in urgent **failing compensation**, from whatever source it may arise. Either may advantageously be combined with caffeine or digitalis according to the nature of the case. In urgent cases, strychnine ($\frac{1}{30}$ gr.) must be hypodermically injected. In fact, it is the only reliable drug in cases of sudden emergency. Hypodermic injection sometimes cures collapse due to cholera or snake bite. According to Anstie, it cures coldness of hands and feet. In **narcotic** and **chloroform** poisoning strychnine injection keeps up the action of the heart and respiration.

Respiration.—Strychnine helps expectoration by strengthening the expulsive force, and stimulating the respiratory centre, as in **chronic bronchitis, protracted pneumonia, phthisis, emphysema**, &c It may advantageously be given along with expectorants. It checks **phthisical night sweats**, perhaps by stimulating the respiratory centre, and averts death in **chloroform poisoning** ($\frac{1}{30}$ gr. hypodermically).

Nervous System.—As a powerful spinal stimulant, it is mainly used in diseases of the nervous system.

1 **Paralysis.**—Strychnine is of signal service in (*a*) **paresis or incomplete paralysis**; (*b*) **functional paralysis or paralysis of reflex origin**, as facial palsy, hemiplegia, paraplegia, &c.; (*c*) **local paralysis** as that of the forearm, larynx, sphincter, eyes, due to any toxic agent, as lead, alcohol or tobacco, (intramuscular subcutaneous injection $\frac{1}{30}$ to $\frac{1}{10}$ gr. sometimes gives excellent results); (*d*) **diphtheritic paralysis**; (*e*) **infantile paralysis.** But the following conditions contraindicate its use :—(*a*) When the paralysis is of recent origin. (*b*) When rigidity of muscles still exists. (*c*) When there is much wasting of muscles (Sometimes progressive muscular atrophy is stayed in its progress by the hypodermic injection of $\frac{1}{30}$ gr. increasing to $\frac{1}{20}$ gr., given once daily). (*d*) When head symptoms are present. (*e*) And, when the muscles do not respond to electricity. The results obtained in the treatment of nervous diseases have been very uncertain. The great point to remember is that when there is no lesion of the anterior cornua it is scarcely indicated. Moreover if there be active mischief going on in this part, stimulation by strychnine is likely to do more harm than good. Always bear in mind Hilton's law of 'Rest for the inflamed organ.'

2. **Sensory paralysis.**—It is of no value in such paralysis, but the hypodermic injection over the temporal region sometimes benefits amaurosis.

3 **Chronic nervous disorders.**—The improvement that is noticed at times in chorea, neuralgia, insomnia, chronic alcoholism, is due more to the improvement of digestion, than to any specific action. In hysteria accompanied by undue excitability of the peripheral sensory nerves, it is positively injurious. Strychnine whether given by mouth or subcutaneously relieves drink craving.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Besides the above, nux vomica or strychnine can be successfully employed in **atonic conditions of the bladder** and **sexual debility.** Strychnine is sometimes injurious in debility from sexual excess, though bromides do good. In mental depression from over-work it should be used after the suspension of work. A drop of the tincture in a teaspoonful of water given every 5 or 10 minutes for about 8 doses and then at longer intervals decidedly improves *sick-headache* (Ringer). It is said to be of immense value in obviating and controlling **post partum hæmorrhage** and **menorrhagia.**

Mode of administration.—Nux vomica and strychnine are best given as *pills* or *mixtures*. Hypodermically Liqr. strych. Hydrochloride (2 to 4 ms.) or the nitrate can be used. Strychnine should not be given per rectum. Brunton recommends a good **dinner pill** with Ext. Nucis vom. ½ gr., Pulv. Ipecac ½ gr., Pil. Rhei. Co 4 grs.; m. ft. pil 1. To be taken before dinner. As a tonic after malarial fever the writer combines it with acid nitro hydrochloric. dil. and infusion of chiretta as in the formula.—Tr. Nucis vomicæ 2 drs., Acid. Nitro Hydrochlor. dil. 2 drs, Quin. Hydrochloride 24 grs., Spt. Chloroform 2 drs, Inf. chiretta ad. 12 ozs. Mist. One ounce thrice daily ½ an hour before food.

OLEUM OLIVÆ.

Olive Oil. N. O. *Oleaceæ*.

Habitat.—South of Europe (Introduced on the Himalayas and Nilgiris).

Source.—The oil expressed from the ripe fruits of *Olea europæa.*

Characters.—Pale yellow or greenish-yellow, with faint odour and bland taste. Sp. gr. 0.914 to 0.919. Congeals partially at 32° F. *Impurities.*—Cotton seed and other oils.

Composition.—(1) *Triolein*, a fluid oil composed of oleic acid and glyceryl, 72 p.c. (2) *Tripalmitin*, a solid oil composed of palmitic acid and glyceryl, 28 p. c.

Action.—Nutritive, biliary lithontriptic and mild laxative.

Dose.—¼ to 1 oz. or more.

Enters into.—Emp. Ammoniaci c. Hyd., Emp. Hydrargyri., Emp. Picis, Emp. Plumbi, Lint. Ammoniæ, Lint. Calcis, Lint. Camphoræ, Ung. Capsici, Ung. Hydrargyri Co., Ung. Hydrargyri, Ung. Resinæ, besides hard soap, soft soap and glycerin.

NON-OFFICIAL PREPARATIONS.

1. **Oleum Olivæ c. Acido Oleico.** *Syn.*—*Lipanin.*—Olive oil containing an additional 5 p.c. of oleic acid and flavoured with essential oil of almonds. A substitute for codliver-oil. *Dose.*—1 to 2 drs.

2. **Mistura Olei Olivæ.**—Olive oil 1 oz., tragacanth powder 25 grs., syrup ½ oz., water to 4 oz. *Dose.*—1 to 2 ozs.

3. **Maltolivine.**—A combination of Codliver-oil and maltine.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Palatable and cheap. Used as a substitute for codliver-oil in phthisis, rickets and marasmus. *Dose.*—2 to 4 drs.

Pharmacology and Therapeutics.

Externally.—Olive oil is a bland **unirritating** fixed oil which may be used as an inunction for rendering the skin soft, smooth and supple. It is therefore an excellent **emollient** in dry skin diseases, such as **psoriasis** and **xeroderma**. It is a basis for liniments and ointments, and as a **lubricating** agent is employed in massage. It softens and aids the removal of the **scabs of eczema, favus**, &c., and protects the skin from the irritating effects of urine, fæces and acrid discharges. It checks **debilitating sweating** when rubbed into the surface of the body. In the same way, when mixed with 4 or 5 p.c. of phenol, it can be used as a **disinfecting inunction** in the desquamative stage of scarlatina, small-pox and plague. To prevent the spread of ringworm, weak carbolic oil is a capital application. Lin. calcis is a soothing protective to **burns** and **scalds**. It is absorbed by the cutaneous lymphatics, and **gives nutrition** to the tissues, but not to the same extent as is done by cod-liver oil (q. v.).

Internally.—As a topical demulcent, it is useful in **irritant poisoning**, except by phosphorus. In small doses, it undergoes the same changes in the intestinal canal as cod-liver oil and is absorbed. In the tissues, its action is also identical with that of cod-liver oil, with the differences already alluded to. It is therefore a **nutrient** and a **food**, and can be given in wasting diseases. In large doses (1 to 2 ozs.) it is a **mild laxative**, producing painless, soft stools, and is of great value in **inflamed and ulcerated piles, rectal ulcers, anal fissures**, and **constipation**, especially if produced by opium. It acts also as a **laxative** when given as an **enema** (4 ozs. to ½ pint of starch mucilage), in **fæcal impaction** and **intestinal obstruction**. Because the cholestrine of the gall stones is soluble in pure olive oil at the normal body temperature, it has been strongly recommended as a **solvent for gall-stones**, on the supposition that some of the constituents of the oil are excreted with the bile. 10 to 20 ozs. or even more of the oil have thus been given daily to those who suffer from **biliary calculi**, sometimes with good results. It is said that in 6 oz. doses, 12 hours after a blue pill, it has caused gall stones to pass out. It can be taken with food.

OLIVERI CORTEX.

Oliver Bark. (*Ind. and Col. Addendum*).

Syn. B. P.—Black Sassafras.
Habitat.—Australasian Colonies.
Source.—The dried bark of *Cinnamomum Oliveri*.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—About 1 in. long, ½ in. wide; flat, covered with granular periderm of a deep orange brown colour. The tissue beneath and the bark inside are amber brown. Odour aromatic, spicy. Taste agreeable, spicy, camphoraceous.

Action.—Aromatic.

Official Preparation.

1. **Tinctura Oliveri Corticis.**—1 in 10 of Alcohol (60 p. c.). **B. P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

It is used for the same purposes as cinnamon and sassafras.

OPIUM. Opium.

N.O. *Papaveraceæ.*

Syn. I.V.—*Afim*, Beng. Hind.; *Ahifen*, Sans.

Habitat.—Asia-Minor, China, Persia and India (Behar and Malwa).

Source.—The juice obtained by incision from the unripe capsules of *Papaver somniferum* (white poppy), inspissated by spontaneous evaporation.

According to the B. P., any suitable variety of opium may be employed as a source of tincture and extract of opium of the respective alkaloidal strengths, provided that when dry, it contains not less than 7½ p. c. of anhydrous morphine, but, when otherwise used for officially recognised purposes, opium must be of such a strength that when dried and powdered, it shall yield by the official method *not less than* 9½ *to* 10½ *p. c. of anhydrous morphine.* Opium containing more morphine may be diluted to that strength with any opium containing between 7½ and 10 p. c. of morphine or sugar of milk.

Characters.—Rounded, irregular or flattened masses, from 8 ozs. to 2 lbs. When fresh, plastic; and internally, moist, coarsely granular or nearly smooth, reddish or chestnut brown, but becoming harder on keeping and darkening to blackish-brown. Odour strong, characteristic. Taste bitter. *Impurities.*—Excess of water, stones, brick-dust, fruits, leaves, starch, &c.

Varieties.—(1) *Asia-Minor opium* known also as Smyrna, Turkey and Levant opium, having the above characters, but covered with poppy leaves, and fruits or seeds of *Rumex.* (2) *Constantinople opium* includes sometimes Turkey and Levant opium, in cakes or lenticular masses with a poppy leaf, but without *rumex* seeds. (3) *China opium i.e*, what is produced in China is rarely met with at Calcutta. (4) *Persian opium* in sticks or lumps. (5) Indian opium as manufactured by the Indian Government is of 3 kinds.—(*a*) *Provision opium* for China in balls covered with poppy leaves. (*b*) *Abkari or excise opium* for India in square cakes covered with Nepal paper. (*c*) *Medical opium* in cake and powder is made in Patna from (*a*) and (*b*), the highest in consistence and colour being selected. Besides, there are Egyptian, German, French and English varieties.

Manufacture of opium.—It is prepared in India as follows —As soon as the capsules of cultivated poppy plants are fully developed, they

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

are scratched in the afternoon by a scarifier, which consists of 4 to 6 iron blades tied together slightly apart. A milky juice immediately exudes from these vertical parallel incisions, and is allowed to flow and thicken during the night. Early next morning, it is scraped off by an iron scoop and is collected into an earthen vessel. The incisions are repeated as long as any milky juice flows. The collected juice is evaporated and purified to the required consistence and then brought to the Government factory, where it is examined as to its purity, colour, odour, consistence, &c. The poppy petals are made into cakes to form the inner and outer coverings of the balls.

Composition.—The chemistry of opium is complex. It consists of (1) *Primary alkaloids*, 18 in number—

Morphine about 12 p.c.	Cryptopine.	
Codeine about ·6 p.c.	Protopine.	Rhœadine.
Thebaine about ·3 p.c.	Hydroctarnine.	Codamine.
Anarcotine or *Narcotine.*	Laudanine.	Gnoscopine.
Narceine.	Laudanosine.	Lanthoptine.
Papaverine.	Meconidine.	Xanthaline.
Pseudo-morphine.		

(2) *Secondary alkaloids* or *Derivatives*, 8 in number—

Apomorphine.	Apocodeine.	Thebenine.	Cotarnine.
Oxydimorphine.	Desoxycodeine.	Thebaicine.	Rhœadenine.

(3) *Neutral Substances*, 3 in number.—

Opianin or Meconin, Meconiasin, and Porphyroxin.

(4) *Organic Acids*, 3 in number.—Meconic acid, Thebolactic acid, Acetic acid.

(5) *Water.*—About 16 per cent.

(6) Resin, glucose, fats, caoutchouc, essential oil, odorous substances and salts of ammonium, calcium and magnesium.

Variation in composition.—The percentage of morphine varies in Patna opium from 3 to 5, and in Smyrna opium from 5 to 10½, whereas that of narcotine in the former 4 to 6, and in the latter 1 to 2.

Incompatibles.—Tannic acid and astringent vegetable preparations, salts of zinc, copper, iron, arsenic, lead and silver. Alkalis, their carbonates and ammonia.

Tests.—Add a weak solution of Fe_2Cl_6 to an aqueous solution of opium, when it at once assumes a blood red colour, due to the presence of meconic acid. This colour is not destroyed by HCl (distinction from *acetates*) or by Hg_2Cl_2 (distinction from *Sulphocyanides.*)

Morphine gives a beautiful greenish blue colour with a dilute solution of Fe_2Cl_6.

Porphyroxin, first described by Merck, is found in Smyrna and Bengal opium and turns purple in the presence of HCl.

B.P. Dose.—½ to 2 grs.

Official. Preparations.

1. **Emplastrum Opii.**—1 in 10. A hard brown solid. A local sedative.

2. **Extractum Opii.**—2 in 1. (Morphine 20 p.c. Standardized.) Aqueous. Dark brown. **B. P. Dose.**—¼ to 1 gr. much stronger. General sedative, hypnotic, &c.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

From Ext. Opii is made—

3. **Extractum Opii Liquidum.**—1 in 13⅓. Morphine ¾ gr. in 110 ms. Dark brown. Standardized.

B. P. Dose.—5 to 30 ms. A weak substitute for Liqr. Opii Sedativus (Battley).

4. **Pilula Plumbi cum Opio.**—1 in 8, or 12½ p. c. of opium. Astringent, narcotic. Ought to be freshly prepared.

B.P. Dose.—2 to 4 grs.

5. **Pilula Saponis Composita.**—1 in 5, or 20 p.c. of opium. A light brown mass. **B.P. Dose.**—2 to 4 grs. More soluble than solid opium.

6. **Pulvis Cretæ Aromaticus cum Opio.**—1 in 40, or 2½ p.c. of opium. A pale brown powder. Suitable for children as an astringent and carminative. **B.P. Dose** —10 to 40 grs. ; ½ to 1 gr. for a child 1 year old.

7. **Pulvis Ipecacuanhæ Compositus.** *Syn.—Dover's Powder.*—1 in 10, or 10 p.c. opium. A good diaphoretic. **B.P. Dose.**—5 to 10 grs.

From Dover's Powder is made—

8. **Pilula Ipecacuanhæ cum Scilla.**—1 in 20, or 5 p.c. of opium. A brown mass. Expectorant and narcotic **B.P. Dose.**—4 to 8 grs.

9. **Pulvis Kino Compositus.**—1 in 20, or 5 p.c. of opium. A dark red powder. An astringent and narcotic. **B.P. Dose.**—5 to 20 grs.

10. **Pulvis Opii Compositus.**—1 in 10, or 10 p.c. of opium. A brown powder. Anodyne and narcotic. **B.P. Dose.**—2 to 10 grs.

11. **Suppositoria Plumbi Composita.**—1 gr. of opium in each.

12. **Tinctura Opii.** *Syn.—Laudanum.*—A dark reddish brown liquid. Standardized to contain 75 p.c. of morphine.

B.P. Dose.—5 to 15 ms. for repeated administration. 20 to 30 ms. for a single dose. A general sedative, narcotic and hypnotic.

From Tr. Opii is made :—

13. **Linimentum Opii.**—1 in 2. A black liquid. A local anodyne.

14. **Tinctura Opii Ammoniata.** *Syn.—Scotch Paregoric.*—1 gr. opium in 96 ms. Expectorant and anodyne.

B.P. Dose.—½ to 1 dr. diluted.

15. **Tinctura Camphoræ Composita.** *Syn.—Paregoric, Paregoric Elixir.*—Expectorant, Anodyne and stimulant. **B.P. Dose.**—½ to 1 dr. 4 ms. for a child 1 year old.

16. **Unguentum Gallæ cum Opio.**—1 in 13⅓, or 7½ p.c. of opium. A soothing anodyne pile ointment.

N.B. It is to be noted that the following preparations contain opium though their names do not indicate it :—Pill. Ipecac. c. Scilla, Pil. Saponis Co., Pulv. Ipecac. Co., Pulv. Kino Co., Sup. Plumb. Co. and Tr. Camph. Co.

Non-Official Preparations.

1. **Enema Opii. B.P. '85.**—½ dr. tincture to 2 ozs.

2. **Lint. Opii Ammoniatum. B. P. C.**—Lint. Saponis 6, Lint. Camph. Co. 6, Tr. Opii 6, Lint. Belladon. 1, Liq. Ammon. Fort. 1 mix. and after standing one week filter quickly.

3. **Liqr. Morphinæ Bimeconatis** (*Squire*).—Morphine 1 p. c. A purified solution of the whole of the alkaloids of opium in a neutral state. *Dose.*—5 to 30 ms.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

4. **Meconii Periodidum.**—The above alkaloids combined with excess of iodine. *Dose.*—$\frac{1}{8}$ to $\frac{1}{4}$ gr.

5. **Sydenham's Laudanum** or **Tr. Opii Crocata.**—It is Tr. Opii with saffron, cloves and cinnamon water, &c.

6. **Trochiscus Opii, B.P. '85.**—$\frac{1}{10}$ gr. of Extr. Opii in each. *Dose.*—1 to 6.

7. **Vinum Opii.**—Opium powder $1\frac{1}{2}$, Sherry 20; macerate 7 days and filter: used as a collyrium (1 in 10 of water). 1 of opium in $13\frac{1}{2}$. *Dose.*—10 to 40 ms.

8. **Narceina.**—Light white flexible crystals. Soluble 1 in 400 of water. A mild hypnotic, also useful in whooping cough for checking spasms. Produces no constipation, and less headache than morphia. *Dose.*—$\frac{1}{2}$ to 1 gr. or more.

9. **Narcotina.** *Syn.*—*Anarcotine.*—White inodorous crystalline prisms. Insoluble in water. An antiperiodic, in which respect it resembles quinine. *Dose.*—1 to 3 grs.

10. **Cotarnine Hydrochloride.** *Syn.*—*Stypticine.*—A derivative of narcotine. Primrose coloured granular crystals, very soluble in water and alcohol. Is allied to hydrastine: it is, in fact, methoxyl-hydrastinine Useful in uterine hæmorrhage, and to check bleeding from the urethra after catheterisation. *Dose.*—$\frac{1}{4}$ to $\frac{1}{2}$ gr. internally or hypodermically.

MORPHINÆ ACETAS. Morphine Acetate.

$C_{17}H_{19}NO_3$, $C_2H_4O_2$, $3H_2O$.

Source.—The carefully dried salt obtained by neutralising morphine with acetic acid.

Characters.—A white crystalline or amorphous powder. *Solubility.*—1 in $2\frac{1}{2}$ (almost) of water, 1 in 100 of alcohol (90 p. c.), 1 in 5 of glycerin.

Incompatibles.—Salts of copper, iron, mercury, lead, zinc, alkaline carbonates, lime water, liqr. arsenicalis, and substances containing tannin.

Dispensing Hints.—A little acetic acid is to be added to make solution, as the salt loses a little acid on drying. Aqueous solutions deposit basic salts.

Action.—Anodyne, hypnotic, narcotic. **B.P. Dose.**—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

Official Preparations.

1. **Liquor Morphinæ Acetatis.**—1 gr. in 110 ms. Almost colourless. **B.P. Dose.**—10 to 60 ms.

Non-Official Preparations.

1. **Injectio Morph. et Atropinæ Hypodermica.**—Morphine Acetate $\frac{1}{4}$gr. and Atropine Sulphate $\frac{1}{30}$gr. in every 6 ms *Dose.*—1 to 6 ms.

2. **Hypodermic Lamels.**—Each contains $\frac{1}{4}$ gr. of Morphine; and $\frac{1}{4}$ of Morphine with $\frac{1}{120}$ gr. of Atropine. These are safer.

MORPHINÆ HYDROCHLORIDUM.

Morphine Hydrochloride. $C_{17}H_{19}NO_3$, HCl, $3H_2O$.

Syn. B.P. '85.—Hydrochlorate of Morphine.

Source.—Hydrochloride of an alkaloid obtained from opium.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Acicular prisms of a silky lustre, or a white powder. *Solubility.*—1 in 24 of cold, 1 in 50 of alcohol (90 p c.) 1 in 8 of glycerin.
Incompatibles.—Similar to Morphine Acetate.
Action.—The same as those of acetate. **B.P. Dose.**—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

OFFICIAL PREPARATIONS.

1. **Liquor Morphinæ Hydrochloridi.** *Syn. B.P.—Solution of Hydrochlorate of Morphine.*—1 gr. in 110 ms. colourless.
B.P. Dose.—10 to 60 ms.
2. **Suppositoria Morphinæ.**—$\frac{1}{4}$ gr. in each.
3. **Tinctura Chloroformi et Morphinæ Composita.**—Chloroform $\frac{2}{3}$ m., Acid Hydrocyanic Dil $\frac{1}{2}$ m., and Morphine hydrochlor. $\frac{1}{11}$ gr. in 10 ms. **B.P. Dose.**—5 to 15 ms.
4. **Trochiscus Morphinæ.**—$\frac{1}{30}$ gr. in each. *Dose.*—1 to 6.
5. **Troch. Morph. et Ipecacuanhæ.**—$\frac{1}{30}$ and $\frac{1}{12}$ gr. in each. *Dose.*—1 to 6.

NON-OFFICIAL PREPARATION.

1. **Linctus Morphinæ, U.C.H.**—Liq. Morph. Hyd. 3 ms., Spt. Chloroform 3 ms., Glycerin or treacle 60 grs., water to 1 dr.
Dose.—1 dr., 3 or 4 times or oftener daily. To be swallowed slowly.

MORPHINÆ TARTRAS. Morphine Tartrate (new).

$(C_{17}H_{19}NO)_2, C_4H_6O_6, 3H_2O.$

Source.—May be prepared by the combination of Morphine and tartaric acid in molecular proportions
Characters.—A white powder consisting of fine nodular tufts of minute acicular crystals. *Solubility.*—1 in 10 of water.
Action.—The same as those of the hydrochloride.
B.P. Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ gr.

OFFICIAL PREPARATIONS.

1. **Injectio Morphinæ Hypodermica.**—3 grs. in 110 ms.
B.P. Dose.—2 to 5 ms. hypodermically.
2. **Liquor Morphinæ Tartratis.**—1 gr. in 110 ms. Colourless. Action as those of acetate and hydrochloride. **B.P. Dose.**—10 to 60 ms.

ADDITIONAL NON-OFFICIAL PREPARATIONS.

1. **Morphina.**—The chief alkaloid of opium. A white crystalline powder. *Solubility.*—1 in 1000 of cold water, 1 in 100 of alcohol, 1 in 10 of oleic acid. *Dose.*—$\frac{1}{10}$ to $\frac{1}{2}$ gr.
2. **Heroin.** *Syn.—Diacetyl-Morphine Hydrochloride.*—A fine white powder soluble in water. A substitute for morphine. *Dose.*—$\frac{1}{12}$ to $\frac{1}{8}$ gr. in pill. A useful hypnotic in heart disease.
3. **Peronin.** *Syn.—Benzoyl-Morphine Hydrochloride.*—A white powder soluble in water and alcohol. Hypnotic, analgesic, respiratory sedative in asthma, phthisis, rheumatism. *Dose.*—$\frac{1}{2}$ to $\frac{1}{3}$ gr.
4. **Dionin.** *Syn.—Ethyl-Morphine Hydrochloride* (Merck).—A white crystalline powder, soluble in water. Pleasant substitute for morphine without its undesirable effects. Recommended in morphine habit.
Dose.—$\frac{1}{4}$ gr. 2 or 3 times daily. Subsequently $\frac{1}{2}$ to $\frac{1}{3}$ gr.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

5. **Morphinæ Hydrobromidum.**—A white amorphous powder. Soluble 1 in 22 of water *Dose.*—$\frac{1}{8}$ to $\frac{1}{4}$ gr.

6. **Morphinæ Meconas.**—Minute white acicular crystals. A natural salt of morphia, said to derange the head and bowels less than the other salts. Soluble 1 in 34 of water. *Dose.*—$\frac{1}{8}$ to $\frac{1}{4}$ gr.

7. **Morphinæ Lactas.**—A white crystalline salt, soluble in water 1 in 8. *Dose.*—$\frac{1}{8}$ to $\frac{1}{4}$ gr

8. **Morphinæ Sulphas.**—Colourless acicular crystals. *Solubility.*—1 in 21 of water, freely in hot water. *Dose.*—$\frac{1}{8}$ to $\frac{1}{4}$ gr.

9. **Glycaphorm.** *Syn.—Glycerole of Heroin.*—Contains $\frac{1}{15}$ gr. of heroin in each drachm of a vehicle consisting of glycerin 3, Syrup of Roses 4, water 1. A useful cough linctus. *Dose.*—1 in 2 drs.

10. **Glyco-Heroin.**—A proprietory article of somewhat similar composition. *Dose.*—1 dr.

Pharmacology of Opium and Morphine.

Opium and morphine resemble each other so closely in their actions that one description will suffice for both.

Externally.—Opium to a certain extent depresses the sensory nerves, and is therefore a local **anæsthetic** and **anodyne**, but this fact is denied by many authorities. It is absorbed by the unbroken skin, but more freely by the denuded and exposed mucous surfaces.

Internally. **Gastro-intestinal tract.**—In moderate doses, opium causes dryness of the mouth, tongue and throat from the **diminished secretions**, due to its direct, local and remote action after absorption. In the same way, it acts on the **stomach** *reducing its sensibility, secretion, and peristalsis.* At the outset, it may sometimes cause nausea and vomiting from the irritation of the gastric nerves. As a result of all these actions, appetite fails, digestion is retarded, and pain, if any, is relieved. Afferent impressions or direct emetics can no longer induce vomiting. Entering the intestines, it performs the same functions, but its activity is more marked. The secretion is considerably lessened and the peristalsis is so far reduced or arrested that **constipation** results. The paralysis of the muscular coat of the intestines is due to irritation of the inhibitory nerves of the walls of the bowels through the splanchnics. Hence, it is a **sedative, astringent** and **anodyne** to the bowels. In very minute doses ($\frac{1}{2}$ to 1 m. of Tr. Opii), it has been observed to act as a **purgative**, probably either by lessening the action of the inhibitory nerves, or by diverting stimulus from them to the accelerator nerves of the bowels. Excessively large doses, about 1 dr. of laudanum, injected into the veins purge by causing tetanic contractions of the intestines. Subcutaneously injected, it is excreted into the stomach.

Blood and circulation.—Morphine enters the blood less rapidly than other alkaloids, and is found in the tissues as an oxidation product, oxydimorphine. What becomes of the other alkaloids is not known. In moderate doses, it **stimulates the**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

heart by its direct action on the nervo-muscular structure of the organ, and through the cardiac centre ; but in larger doses it acts as a depressant, due to its direct local action and the stimulation of the vagus centre, making the **pulse small and slow**. Before death, the depression is so marked that the acceleration of the heart becomes an impossibility ; but the death in opium poisoning is *not due to the failure of the heart, but to the paralysis of the respiratory centre*, as will be seen presently. The vaso motor system is not affected till shortly before death, when the vessels dilate.

Respiration—The respiratory centre is affected sooner than the cardiac, tending to make the respirations slow and feeble. Finally death takes place from **asphyxia**, when the heart still beats. Hence, it is a **direct paralyser** of the **respiratory centre**. It reduces the bronchial secretion and pulmonary circulation.

Liver—Biliary secretion is considerably reduced, causing the stools to be pale or clay coloured, or jaundice may set in. The amount of sugar in diabetic urine, and that of urea and carbonic acid, according to some authorities, are diminished.

Temperature.—Large doses decidedly lower the temperature.

Nervous system.—The chief action of opium is on the nervous system. In small doses, it **first excites the higher faculties**, by directly influencing the cells of the convolutions, and not the cerebral circulation as is supposed. During this stage, with a few, the excitement is a pure exaltation of feelings, the imagination being pleasantly excited with a sense of happiness and comfort. With others, the intellectual activity is heightened, and they can concentrate their energies better on a particular object. But, in the majority of cases, the excitability is not uniform. Extravagant and depraved ideas are often indulged in. **Depression** soon follows excitement, with **drowsiness and sleep**, of course according to the dose. After waking, there is a feeling of headache and nausea. In this stage, the **higher centres** are first **depressed** and then the **lower ones**. Hearing, sight and cutaneous sensibility become blunted, and the sleeper feels no pain. If the dose is large, the excitement is only momentary or absent, **coma** soon supervenes with a profound **depression** of the **cerebrum and reflex excitability**, the **pupils being contracted**. Therefore opium is a **stimulant, anodyne, hypnotic, narcotic and myotic**. Its effects on the **cardiac, respiratory, and vasomotor centres** have already been described. The **vomiting centre** may be stimulated in the beginning,

Nerves and muscles.—The **motor cells** in the **brain and spinal cord** are first stimulated and then depressed, as evidenced by restlessness, followed by muscular weakness. The **motor and sensory nerves** are similarly affected. In the same way, it depresses the **afferent nerves of the viscera**.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

There is no complete loss of muscular power or irritability, for even in severe opium poisoning, a patient can be made to walk if supported. Brunton thinks that opium influences the terminal ends of the vaso motor nerves, and thus diminishes or prevents the reflex dilatation of the vessels caused by local irritation.

It will thus be seen that opium while acting on the brain illustrates the **two laws** already described in page 158.

Kidneys—Opium **reduces** the quantity of urine secreted. Morphine is found unchanged in the urine. There is a chance of morphine being reabsorbed from the bladder, and a probability of its retention in the body, from defective elimination in renal disorders.

Skin.—Opium is a **diaphoretic,** acting by directly stimulating the sweat glands, and not by its local cutaneous action. It may cause itching and a rash (page 148).

Secretions.—It diminishes every secretion of the body except that of the skin and the mammary glands.

Elimination.—It is excreted by most of the secretions of the body, chiefly bile, milk and urine.

Acute toxic action.—Poisoning by opium is very common in India, especially in Bengal, as there is no restriction to its sale. It is chiefly suicidal, and is more frequent amongst the Indians than the Europeans. In most cases they mix it with oil before swallowing. Excitement in such a case is very brief or none at all. Drowsiness and stupor soon follow. The patient may be roused at first, but soon passes into a profound coma, and no external stimulus can rose him then. The pupils contract to a pin's point, surface becomes cold and clammy; face and lips livid; pulse very weak and slow; respiration slow, irregular and at the end stertorous; finally the patient dies from asphyxia. A few minutes before death, pupils dilate. P.M. appearances are like those of suffocation.

Diagnosis of opium poisoning.—This falls under the province of Medicine. However, a few hints will enable the reader to form a correct diagnosis. (1) **From alcoholic coma.**—Take a careful *history. Smell of breath* may not help always, as the opium and alcohol may be taken together, or one after the other or some one may pour down the throat. *Pupils* are contracted in opium poisoning, and normal or dilated in alcoholic poisoning. *External stimulus* rouses the patient more readily in alcoholic coma than in opium poisoning. *Stomach pump* will guide in some cases. (2) **Cerebral hæmorrhage.**—History. *Pupils* are unequally contracted, but if the hæmorrhage is on the pons varolii, they may be contracted and render the diagnosis more difficult. *Paralysis* of limbs occurs on one side. *Temperature* generally falls in the beginning and then rises. (3) **Uræmia.**—*Coma* less profound. *Albumen* in the urine. Sometimes convulsions alternating with coma. Examine for *hypertrophy of the left ventricle, artero-sclerosis,* and *retinal changes.* (4) **Diabetic coma** by the breath and the presence of *sugar* and *diacetic acid* in the urine. (5) **Epileptic coma** after a fit *coma* less profound, dilatation of pupils. Examine for *Babinski's sign.* (6) **Hysterical stupor** by its characteristic symptoms and history. (7) **Chloroform, ether** and **carbolic acid poisoning,** by smell and other special symptoms.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Antidotes.—If opium or morphine swallowed, emetics, stomach-pump or apomorphine $\frac{1}{10}$ to $\frac{1}{8}$ gr. subcutaneously. Pot. Permanganas is a chemical antidote (1 gr. neutralises 1 gr. of morphine) and its solution (4 to 8 grs. in 4 to 8 ozs. of water) should be given at once, if the quantity of poison is unknown or large, before emetics or washing. A weak solution of Liqr. Pot. Permanganatis (1½ dr. to tepid water 1 pint) should be employed as a wash for the stomach. After washing 1 pint of strong tea or coffee can be injected into the stomach or per rectum. Atropine $\frac{1}{30}$ gr. hypodermically or Tr. Belladonna 30 ms. by the mouth is to be repeated ½ or $\frac{1}{10}$ hour until pupils dilate or pulse quickens. Strychnine $\frac{1}{30}$ gr. hypodermically, repeated every 2 or 3 hours for heart and lungs. Similarly, artificial respiration and inhalation of nitrite of amyl. Alternate cold and hot affusions, flagellations or taps upon the forehead with finger nails, sinapisms, electricity, smelling salts to the nose, and making the patient walk to and fro, should be adopted to keep the patient awake. Oxygen inhalation is also recommended. The treatment is to be kept up for several hours until the danger is over. Some authorities recommend washing the stomach now and then as opium is excreted in it, but that is unnecessary as the quantity is infinitesimal and the exhaustion is rather too much.

Chronic toxic action or Morphinomania.—Persons get soon habituated to the use, and can consume large quantities. It is therefore necessary that the patient should remain ignorant of the drug. India, Turkey, Persia and China are the principal countries where the drug is habitually indulged in. Morphinomania exists also in England. In India, opium is either eaten or smoked. Moderate doses (5 to 20 grs.) daily do no harm, but *Madak* and *Chandu* smokers are a disreputable set. Moral depravity, emaciation, anæmia, muscular weakness, physical depression, feeble pulse and small tremor, slight ataxy, loss of appetite, indigestion, sluggish bowels, insomnia, drowsy feeling, sexual impotence, amenorrhœa, small pupils, are the principal symptoms of morphinomania.

Treatment.—*Gradual* reduction is the best plan. Tea, coca bark, ammonia may be given to ward off depression and collapse. Sometimes small doses of alcohol may be necessary. If an opium eater be suddenly deprived of his accustomed dose of the drug, cerebral excitement, restlessness, pain in the stomach and a burning sensation in the back give great trouble. These symptoms are due to the formation in the tissues of an acrid irritating substance called "Oxydimorphine." Hence the necessity for gradual reduction of the opium so as to allow of the elimination of this product.

Modifying influences.—Many circumstances modify the action of opium. (1) *Age.*—Children are more susceptible to poisoning. An infant under 1 year should not have more than ½ to 1 m. of the tincture. (2) *Sex.*—Females suffer more from after effects than men. To a nursing mother it must be given with caution. (3) *Idiosyncracy.*—Some cannot take opium without brain symptoms, such as insomnia or delirium, while others suffer from gastric irritation. The writer had to treat a female in whom morphine ⅓ gr. hypodermically given, produced fainting, vomiting, and collapse. (4) *Habit.*—Toleration is readily induced. Large doses become necessary to produce the desired effect, and gradually lead to *opium habit.* The writer knew a person who used to take 40 grs. of morphine daily. (5) *Disease.*—Acute painful diseases require larger doses. Subjects.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of Bright's disease can not bear much opium, and it should be given to them with great caution, also to persons suffering from cardiac, pulmonary and renal diseases, cerebral congestion and alcoholism. (7) *Drugs.*—Chloral hydrate, potassium bromide, chloroform, &c., increase its soporific virtue, while belladonna removes constipation, when given in combination.

Difference of actions between opium and morphine.—Though the description of the pharmacology of opium given in these pages, applies also to that of morphine, yet there are certain differences which are detailed below :—

Opium.	Morphine.
1. Preparations less soluble, slowly absorbed. Action slow but more lasting.	Preparations more soluble, readily absorbed, action quicker but not so lasting.
2. Its several constituents, such as thebaine, codeine, narcotine are convulsants	Morphine not so in man.
3. Action variable on account of varying composition.	Action definite on account of definite composition.
4. Constipation, nausea and indigestion more frequent.	Constipation nausea and indigestion less frequent
5. Better diaphoretic.	Feeble or no diaphoretic.
6. Less sedative and less soporific.	More sedative and more soporific.
7. Greatly reduces the sugar of diabetic urine	Slightly reduces the sugar of diabetic urine.
8. Local action more marked on the intestines.	Less marked on the intestines.
9. Cannot be administered hypodermically.	Can be administered hypodermically.

Antagonists.—Atropine, caffeine, chloroform, cocaine, physostigmine, strychnine are antagonistic to some action or other of morphine. But the antagonism between morphine and atropine is given below in detail :—

	Morphine.	Atropine.
Real	1. Cerebral convolutions depressed.	Cerebral convolutions stimulated.
Real	2. Respiratory centre depressed.	Respiratory centre stimulated.
Real	3. Intestinal peristalsis depressed.	Intestinal peristalsis stimulated.
Apparent	4. Pupils contracted through the pupillary centre in the aqueduct of Sylvius.	Pupils dilated through the paralysis of the ciliary branches of the 3rd. nerve.
Apparent	5. Diaphoretic through central nervous system.	Anhydrotic through the terminal nerves in the glands.

Though morphine and atropine are not true antagonists, yet they are **useful antidotes** to each other in poisoning and are also usefully combined to prevent certain unpleasant symptoms of the former.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Actions and uses of the principal constituents of opium.—(1) *Morphine* is already described. (2) *Codeine* and *Apomorphine* are separately noticed. (3) *Nircotine* or anarcotine is not hypnotic but is said to be antiperiodic in ague. It is the principal constituent of Indian opium. (4) *Thebaine* prodnces convulsions like strychnine and is not used. (5) *Narceine* acts like morphine is not much used. (6) *Papaverine*, *opianine*, *cryptophine* act as morphine. (7) *Laudanine*, *Porphyroxin* like Codeine.

THERAPEUTICS.

Externally.—Opium is chiefly used as a local **sedative** and **anodyne**. Hot poultices or fomentations containing opium or with laudanum sprinkled, or the liniment, are often employed to allay the pain of **pleurisy, rheumatism, peritonitis, lumbago, inflamed joint**, &c. The plaster or the paste of Ext. opii and glycerin aborts **boils** and **carbuncles** when applied early. Opium decidedly soothes the pain of **sores** and **ulcers**. Morphine dissolved in glycerin relieves the pain of **cancers**. Vin. Opii, B. P. 1864, or Ext. opii liq., dropped into the eyes, reduces pain of **conjunctivitis**. *Earache* is relieved by laudanum. Opium or morphine suppository and the gall and opium ointment often allay the pain of **anal fissures** and **piles**. Opium injection *per rectum* relieves **rectal tenesmus, urethral spasms, or pelvic pains**. **Neuralgic pains** are better relieved when morphine is used hypodermically or endermically.

Internally.—Opium is a remedy *par excellence* for removing pain, subduing excitement and irritation, and inducing sleep.

Mouth and stomach.—Laudanum on a pledget of cotton wool put within a carious tooth relieves **toothache**. Opium often controls **salivation** due to reflex irritation. Opium or morphine allays **gastric pain** and **vomiting** from whatever cause they arise. Thus it is very useful in gastric **ulcer, cancer** and **gastritis** produced by alcoholism. Morphine with bismuth markedly relieves **gastrodynia** with or without heartburn. Reflex vomiting is readily checked by morphine, but not the pure gastric neuralgia, which is benefited by small doses of arsenic.

Intestines—Of all the drugs we have for **diarrhœa** opium is the most valuable, both in the acute, chronic and tubercular varieties. In **lienteric diarrhœa** where the half digested food is simply swept down the canal by the excessive peristalsis, opium acts remarkably well. It is a capital plan to administer one or two doses of opium in diarrhœa or dysentery after the expulsion of the offending matters. It can be combined with other astringents in diarrhœa and with ipecacuanha in **dysentery**. In the early stage of **cholera**, especially when preliminary diarrhœa is the prominent symptom, opium may be usefully employed, but not in the cold stage. According to Ringer a small hypodermic injection of morphine (½ to ¼ gr.) promptly checks **choleraic** diarrhœa of children. In **typhoid fever** it serves a double purpose, by con-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

trolling wakefulness and delirium and subduing diarrhœa. A rectal injection may sometimes relieve where the ordinary method of administration by the mouth has failed, especially so in **dysentery.** It relieves **intestinal colic** caused by sharp aggravated contractions of the bowels. Large doses are needed to paralyse the bowels in **peritonitis, enteritis, perityphlitis, hernia, perforations,** and after **wounds** or **operations** in the abdomen. Serous inflammations are well treated when opium is given with a free hand. The patients should be kept just drowsy, and pupils slightly contracted until inflammatory symptoms subside.

Enema Opii is serviceable in various ways by checking flux, subduing local irritation, pain and spasm of the rectum and neighbouring structures, and setting at rest the pelvic organs. A **morphine suppository** generally averts a rigor likely to follow after **catheterism** or **abdominal operations.** To soothe local rectal pain, an ordinary dose is enough for rectal injection, but a large dose is required to induce sleep.

Heart and blood vessels.—Being a powerful despressant to the heart, opium must be given with caution in heart disease. There can be no question that unmistakable relief is afforded by morphine injection in the **dyspnœa of heart disease** and of **blood vessels,** and in **angina pectoris.** A single injection of $\frac{1}{6}$ gr. brings on refreshing sleep from which the patient wakes wonderfully revived ; but it cannot relieve **cardiac dyspnœa** caused by the pressure of **serous** and **dropsical fluid.** Nowadays heroin is preferred in all cases of cardiac disease. It is much safer than the ordinary morphia salts. If the kidneys are diseased, opium is contra-indicated. Opium may also be usefully employed in soothing the pain of **aneurysm** and **intra-thoracic tumors.** Belladonna may be usefully combined to counteract the depressing influence.

On account of its soothing effect on the heart and blood vessels, it controls hæmorrhage, and is therefore an excellent **hæmostatic** in **intestinal** and **pulmonary bleeding.** In the former, it is of special value, as it paralyses the peristaltic movements ; and in the latter, it not only slows the heart, and reduces blood pressure, but lessens cough, produces sleep, and removes mental anxieties. Pil. Plumb. c. Opio, or a mixture containing morphine acetate, lead acetate and acetic acid, or opium with ergot and tannic acid may be usefully employed.

Respiratory tract.—Opium relieves *cough* and should not therefore be prescribed indiscriminately. When the coughing is harrassing and frequent, without much expectoration, and without any tendency to asphyxia or lividity, due to **reflex irritation** either from an intra-thoracic tumor, or from excessive irritability of the nerves, as in pleuritis, opium is justly and admirably indicated. But, when the act of coughing is only to empty the bronchial tubes of the abundant secretion, as in the **bronchitis**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of the aged and infirm, or of the weak and young, opium is positively injurious: for it leads to inspissation and retention of the mucus. In **phthisis** where the tubercles press upon the nerves, and give rise to a reflex cough, opium may be given with benefit. In the same way, by the local application of morphine to the throat, in the form of linctus and lozenge, many reflex coughs can be relieved. Sometimes it gives marked relief to the spasm in **whooping cough**; ¼ to 2 ms. every hour, or $\frac{1}{10}$ gr. every 3 or 4 hours, according to the age of the child, should be continued until the whoop disappears It should be given with great caution in **asthma**, lest it should create an opium habit, but the writer has seen instances, where the habitual use of opium cured asthma. The sharp stitch of **acute pleurisy** or **pleuro-pneumonia** is relieved, as if by a charm, with a hypodermic injection of morphine. **Influenza** and **coryza** are greatly benefited by Dover's powder.

Nervous system.—(1) As a **hypnotic** pure and simple, morphine is inferior to chloral hydrate (see p. 326), but for sleeplessness due to pain or irritation, it is a sovereign remedy. It is often used in the **insomnia** of acute diseases in the **delirium of remittent, typhoid** and **typhus fevers**, of **mania** and **alcoholism**, and in the **restlessness** of visceral diseases. But the gradual tendency nowadays is in many of these diseases to combine it with chloral hydrate, either alone or with the addition of bromides, especially so in mania and delirium tremens. Morphine is sometimes used to prolong the anæsthesia of chloroform. (2) Its superior value as an **anodyne** has been long recognised. The list will be too long if we are only to enumerate the diseases where opium can be used as an anodyne. Besides the diseases already mentioned, morphine is given hypodermically with marked relief in **biliary, renal, lead** and **intestinal colics, sciatica, facial** and other kinds of **neuralgias, severe pleurodynia**. The pains of **fractures, dislocations**, or **other injuries**, of **acute rheumatism, dysmenorrhœa**, and **malignant disease** are only a few instances, where opium or morphine can be most usefully employed. In short, any pain, inflammatory or otherwise, is relieved by opiates. It is to be noted that sufferers from pain can consume large quantities without poisoning. (3) As an **antispasmodic**, opium is sometimes used in epilepsy, hysteria or chorea for various reasons. The writer knows an instance, where a heavy opium-eater suffers from epilepsy, which repeats itself in spite of increasing the dose. Morphine suppository or opium enema decidedly relieves **spasmodic stricture**. Its utility in asthma and whooping cough have already been noticed.

Cord.—The pains and spasms of certain diseases of the cord, such as **locomotor ataxy** are subdued by the subcutaneous injection of morphine. **Morphine is sometimes given to arrest**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the convulsions of **tetanus** and **strychnine poisoning.** A medical man by mistake took 40 ms. of Liq. Strychninæ, and 80 ms. of Liqr. Morphinæ put a stop to the threatening convulsions, he being a daily eater of morphine ½ gr.

Kidneys.—As morphine is not rapidly eliminated by the diseased kidneys, it should be given with the greatest caution in **Bright's disease,** for instances have occurred where small doses produced fatal results. But a hypodermic injection of $\frac{1}{6}$ gr. of morphine has occasionally been found to remove **uræmic insomnia, uræmic convulsions** and **uræmic** or **cardiac dyspnœa.** As it reduces sugar in diabetic urine, opium, codeine and morphine are employed in **diabetes mellitus.**

Skin.—As a diaphoretic, Dover's powder is used in a variety of diseases, such as cold, influenza, and slight inflammatory conditions. It checks the **night-sweats of phthisis.**

Uterus.—Opium is invaluable in arresting a threatening abortion. It must be given in large doses, laudanum in 20 ms. or 30 ms. or the extract in 1 gr. doses every 3, 4 or 6 hours as indicated. Sometimes a suppository or enema succeeds better. When opium fails, morphine with digitalis may succeed. It is also used to relieve afterpains.

Malaria.—It is a fact that opium eaters are less liable to malarial poisoning, and they enjoy better health in malarial districts. Opium occasionally cures **malarious fever** where quinine fails, or the two drugs combined are more successful than either given alone. The writer has seen a few cases of **elephantoid fever** checked by the habitual use of opium.

Mode of administration.—Opium and morphine can be administered by (1) the **mouth,** as pill, powder and mixture ; (2) **per rectum,** as suppository or enema ; (3) by the **respiratory tract,** as smoking, such as *madak* or *chandu* ; (4) **enepidermically,** as plaster or paste ; (5) **epidermically,** as liniment ; (6) **endermically,** as dusting of morphine on a denuded surface ; (7) **hypodermically,** as hypodermic tablet or solution, when the pain is very severe, such as colic or neuralgia. This has a threefold advantage, (*a*) the *required effect* is gained by a smaller dose ; (*b*) *constipation* is less liable to take place, and also appetite is not lost, (*c*) affords *quickest relief* ; and (8) an **insufflation** (morphine acetate ½ gr. with starch 5 grs. A grain of boric acid or iodoform may be added) in painful organic disease of the larynx.

Rules regarding the hypodermic injection of morphine :—

The physician is only justified in doing this in three conditions. (1) When, in the treatment of an acute disorder, one or a few injections only will be required—(recent wounds, acute illness or acute neuralgias). (2) When the morphia habit, if developed, would be a lesser evil than to allow the patient to suffer

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the pain and excitement that can be subdued by the drug (cancer, tubercle). (3) When the death agony is accompanied by severe pain.

APOMORPHINÆ HYDROCHLORIDUM.

Apomorphine Hydrochloride.

$C_{17}H_{17}NO_2,HCl$.

Syn. B.P. 1885.—Hydrochlorate of apomorphine.

Source.—This is the hydrochloride of an alkaloid obtained by heating morphine hydrochloride or codeine hydrochloride in sealed tubes with hydrochloric acid. Morphine losing one molecule of water, thus,—$C_{17}H_{19}NO_3 = C_{17}H_{17}NO_2 + H_2O$.

Characters.—Small, greyish-white, shining needles, turning green on exposure to light or air; faintly acid. *Solubility.*—1 in 50 of water. 1 in 50 of alcohol (90 p. c.).

Action.—Emetic and expectorant.

B.P. Dose.—$\frac{1}{30}$ to $\frac{1}{10}$ gr. hypodermically as an emetic; $\frac{1}{10}$ to $\frac{1}{4}$ gr. by the mouth as an expectorant. Maximum single dose $\frac{1}{7}$ gr.; maximum daily dose $\frac{3}{4}$ gr.

Dispensing hints.—Should be dispensed in coloured bottles when given as a mixture.

Official Preparation.

1. **Injectio Apomorphinæ Hypodermica.**—1 gr. in 110 ms. Should be prepared fresh. **B.P. Dose.**—5 to 10 ms. ($= \frac{1}{22}$ to $\frac{1}{11}$ gr.)

Non-Official Preparations.

1. **Hypodermic Discs.**—Contain $\frac{1}{10}$ gr. in each. Very convenient for use.

2. **Syrupus Apomorphinæ Hydrochloridi. B. P. C.**—Apomorph. Hyd. 5 grs., Acid. Hydrochlor. dil. 15 ms., Alcohol (90 p.c.) 7 drs., Aqua Distilled 7 drs., Syrup to 20 ozs. Dissolve the salt in the spirit and water mixed, then add acid and syrup.

3. **Apocodeinæ Hydrochloridum.**—A pale brown or greyish powder freely soluble in water. A good expectorant and sialagogue when given hypodermically. *Dose.*—25 ms. of a 2 p.c. solution, which must be neutral.

Pharmacology.

Externally.—A 1 per cent solution dropped into the eye causes **anæsthesia**; but it may cause local pain and may induce vomiting from absorption.

Internally. **Stomach.**—Apomorphine is a reliable emetic acting directly on the vomiting centre, and not locally on the stomach. It is therefore an **indirect emetic** (see p. 125). Its action is prompt, powerful and complete, and is not preceded by nausea or followed by any appreciable depression. It does not irritate the stomach and produces **quiescence** when other emetics

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

given by the mouth fail. $\frac{1}{3}$ gr. given *per rectum* also induces vomiting.

Heart and circulation.—In medicinal doses it has no action on the heart and blood vessels, beyond a slight depression from the effect of vomiting, but in large doses, it increases the **frequency** of the **pulse**, probably by stimulating the accelerator nerves. In toxic doses, the pulse beats fall from the paralysis of the cardiac muscles.

Respiratory tract.—Rossbach's experiments have proved that apomorphine produces a **copious secretion** from the mucous membrane, without being preceded or accompanied by **hyperæmia**. This hypersecretion is due to its direct influence on the terminal ends of the gland-nerves, gland cells or the minute ganglia, to which it is carried by the blood current. Thus it renders a thick viscid mucus more liquid. It is therefore a valuable **expectorant**. Large doses depress the respiratory centre.

Nervous system.—Large doses cause **paralysis of the motor nerves**, and therefore of the muscles. In moderate doses it first excites the cerebrum causing delirium and finally paralyses it.

THERAPEUTICS.

Internally.—As a prompt and certain **emetic**, apomorphine is invaluable in **poisoning**, *i. e.* in narcotic poisoning, drunkenness, &c. Its effects are most marked in cases where the power of deglutition is lost, and where the emesis cannot be induced by ordinary drugs on account of the depressed condition of the nervous centres by narcotic poisons. For this purpose $\frac{1}{10}$ gr. hypodermically acts often in 1 to 2 minutes; although given by the mouth, apomorphine may produce vomiting after absorption, but larger doses are necessary. A plum stone obstructing the œsophagus was removed by vomiting induced by apomorphine. As an **expectorant**, it is always given by the mouth. In the early stages of the **inflammation of the larynx, trachea and bronchi**, when the mucous membrane is dry or secretes a viscid tenacious mucus, apomorphine loosens secretion and removes inflammation. In croup and acute bronchitis of children it is useful. In **subacute** or **chronic bronchitis, bronchopneumonia, chronic catarrh of larger tubes**, or **bronchial irritation** caused by the inhalation of jute, flax, cotton or other foreign particles, it is most useful if the secretion is scanty and tenacious. A few cases of dry **bronchial asthma** have been wonderfully relieved by $\frac{1}{30}$ to $\frac{1}{10}$ gr. of apomorphine. It may be given alone or mixed with other expectorants. In whooping cough it has been found serviceable combined with morphine. Sometimes it can be usefully combined with morphine in the form of a linctus with syrup of virginian prune, syrup of tar, or syrup of lemon. Murrell has given 1 gr. for 3 or 4 times a day without bad results. Binz says to use $\frac{1}{60}$ to $\frac{1}{30}$ gr.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Caution.—It should be given with great caution to the feeble, the aged, and children and to those subject to chronic diseases of the heart and lungs.

CODEINA. Codeine.

$C_{17}H_{18}(CH_3)NO_3$, H_2O.

Source.—An alkaloid obtained from opium or morphine.

Characters.—Nearly colourless trimetric crystals. *Solubility.*—1 in 80 of water, 1 in 24 of boiling water, 1 in 2 of alcohol (90 p. c.), 1 in 2 of chloroform.

Action.—Hypnotic, reduces sugar in diabetes.

B.P. Dose.—¼ to 2 grs. Hypodermic injection.—⅛ to 1 gr. Maximum daily dose.—20 grs. cautiously increased.

Non-Official Preparations.

1. **Codeine Pastils.**—½ gr. in each. Take 1 when the cough is troublesome.
2. **Codeine Iodate.**—Analgesic. *Dose.*—½ gr. hypodermically.
3. **Syrupus Codeinæ. B. P. C.**—Codeine 8 grs., Proof spirit ½ oz., Water ½ oz.; dissolve and add syrup to 8 ozs. *Dose.*—1 to 2 tea-spoonfuls.
4. **Pilula Codeinæ Comp.**—Codeine ¼ gr. (increased to 2 grs.), Ext. Nucis Vom. ½ gr., Ext. Lettuce ¼ gr. Mix for one pill. Two or three for diabetes.
5. **Codeinum Hydrochloricum.**—A white crystalline powder freely soluble in water. *Dose.*—¼ to 2 grs.

CODEINÆ PHOSPHAS. Codeine Phosphate.

$(C_{17}H_{18}(CH_3)NO_3, H_3PO_4)_2, 3H_2O$.

Source.—The phosphate of an alkaloid obtained from opium or morphine.

Characters.—White crystals, taste slightly bitter. *Solubility.*—1 in 4 of water, 1 in 200 of alcohol (90 p. c.).

Action.—The same as of codeina. **B.P. Dose.**—¼ to 2 grs. Hypodermic injection.—¼ to 1 gr.

Official Preparation.

1. **Syrupus Codeinæ.**—1 in 240. ¼ gr. in 1 dr. A colourless syrup. **B.P. Dose.**—½ to 2 drs.

Pharmacology and Therapeutics.

Internally.—Codeine is a feeble narcotic, because it does not depress the cerebral convolutions so actively as morphine, but it excites the cord more. It does not produce nausea, vomiting or constipation, but the writer has observed that it often causes costiveness and deficient biliary secretion. It is a great paralyser of the visceral nerves, for it has been found that after administration, irritant poisons, such as arsenic, produced neither vomiting nor purging. It decidedly excites both cerebral and spinal motor centres; consequently muscular tremor may follow.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

in spite of its feeble sedative effect. Cautiously increased, it markedly **lessens the amount of sugar** in diabetes, but not so well as opium.

Internally.—On account of its sedative influence on the visceral nerves, it soothes the **hacking cough of phthisis**, and **visceral neuralgia**. Syrupus Codeinæ is the best to use for allaying cough. Sometimes it is used with advantage in **insomnia** due to pain in some peripheral regions, or to nausea, when it should be given in 1 or 2 gr. doses, every 4 or 6 hours, till sleep comes on. But its chief use is in the treatment of **diabetes mellitus**, in which case it can be given in the form of a pill. The phosphate being more soluble than the alkaloid, can be used in a mixture.

PANCREATIS LIQUOR.

Pancreatic Solution.

Source.—A liquid containing the digestive principles of fresh pig's pancreas, obtained by digesting 5 ozs. of pancreas freed from fat, and triturated with washed sand or pumice stone, in 20 ozs. of alcohol (20 p. c.) for 7 days.

N.B.—Benger's Liquor Pancreaticus is a similar preparation.

Non-Official Preparations of Pancreas.

1. **Ext. Pancreatis.**—An American preparation sold in powder, tablets and peptonising powders.

2. **Pancreatin. U. S.**—Yellow or greyish-white amorphous powder, soluble in water. *Dose.*—2 to 4 grs. **Tablets.**—2½ grs. with sodium bicarbonate in each.

3. **Pilula Pancreatica.** (Benger's).—Keratined. One after meal in pancreatic diabetes.

4. **Pancreatic Emulsion** or **Pancreatised Fat.**—A milky or creamy preparation obtained by mixing and pounding pig's pancreas with lard dissolving in ether and emulsified by spirit and water. *Dose.*—1 to 3 drs. with milk or water.

5. **Peptonised Milk.**—Dilute 1 pint of milk with 4 ozs. of water, and heat to 140° F. (If a thermometer is not at hand, boil one-half of the mixture and add it to the other half). To this, add two tea-spoonfuls of liquor pancreatis or 5 grs. of extract pancreatis with 20 grs. of sodium bicarbonate and leave the vessel near a fire or hearth for 15 minutes, or in the ordinary temperature of the room for 3 hours. If not used atonce, it must be heated to a boiling point. Fairchild's powder containing both the extract and soda is more convenient. Similarly other liquid foods can be treated. The bitter taste of the milk is covered by soda water, or sweetened and warmed for infants.

6. **Pulvis Pancreaticus Alkalinus.** (Benger's.)—Pancreatic enzymes mixed with sodium bicarbonate. In tubes of 20 grs. Each of which is sufficient to peptonise one pint of milk.

7. **Trypsin.**—The proteolytic ferment of the pancreas. A whitish

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

powder having an odour like that of pepsin. Converts proteids into peptones in alkaline media. Used for peptonising milk and in diabetes.

Dose.—8 to 20 grs., in Keratin-coated pills.

Pharmacology and Therapeutics.

Internally.—Normal human pancreatic juice is believed to contain 4 digestive ferments,—(1) *trypsin*, which converts proteids into peptones in alkaline or neutral media; (2) a *milk curdling ferment*, which curdles casein and peptonises milk; (3) *Amylopsin, or pancreatic diastase*, which changes starch into sugar and dextrin; (4) *Steapsin*, a lipolytic ferment which saponifies and emulsifies fat. Both the official and Benger's pancreatic solution contain the first three ferments, and are best suited for pre-digesting liquid food before administration in **dyspepsia, diarrhœa, gastric dilatation, ulcer** and **cancer.** Children deprived of natural nourishment fare well on pancreatised food. Benger's food containing partially dextrinised wheaten flour by dry cooking and impregnated with pancreatic extract, is an excellent diet for such children. Trypsin and desiccated pancreas, in pills coated with keratin, or the Pil. Pancreatica, can be given two hours after meals with 20 grs. of sodium bicarbonate. Keratin protects them from the acidity of the stomach. Pancreatic solution is used in **diabetes** originating from pancreatic functional disturbance. Liquor pancreatis is mixed with **nutrient enemata** just before injection, or injected into the bladder to disintegrate the blood-clots. Pancreatic emulsion is often given with cod-liver oil in wasting diseases, when the stomach cannot well digest fat.

The application of trypsin to the **treatment of cancer** is now receiving widespread trial. The hypodermic injection of sterilised trypsin solutions is combined with its internal administration.

PAPAIN. (*Non-official*).

Syn. I.V.—*Pápyár dtá*, Beng.

Source.—Prepared from the juice of the papaw, *Carica Papaya*.

Characters.—A whitish, amorphous, slightly granular powder.

Action.—Digests fibrin like pepsin. *Dose.*—1 to 8 grs.

Pharmacology and Therapeutics.

Is used for the same purpose as pepsin and is very useful in cases where there are religious objections to the use of the latter. Also is useful as a vermifuge for ascarides. Locally applied, it causes absorption of diphtheritic exudations. The dry powder may be used or it may be administered in the form of an elixir or dissolved in glycerin which has been slightly acidulated with hydrochloric acid.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PAPAVERIS CAPSULÆ.

Poppy Capsules. N. O. *Papaveraceæ.*

Syn. I. V.—*Postodhenri*, Beng.

Source.—The nearly ripe dried fruits of *Papaver somniferum*. The opium yielding poppy is widely cultivated in India. There are 3 centres of cultivation, *viz*.,—(1) Behar, with Patna as its head quarters, (2) Benares and North Western Provinces with Gazipur as their central depot, and (3) Central and Western India and Rajputana.

Characters.—Globular or ovoid, with a thin, dry, brittle pericarp 2 to 3 in. diameter; crowned by stellately arranged stigmas; yellowish-brown, with dark spots. Presents internally thin parietal placentas and numerous, small, reniform, reticulated whitish seeds (*Posto*, Beng. Hind.). Pericarp bitter.

Composition.—(1) *Opium*, a small percentage. The seeds contain a bland oil (*postor tel*, Beng.) which can be used as a substitute for olive oil.

Action.—Said to be a feeble anodyne and narcotic.

Non-Official Preparations.

1. **Decoctum Papaveris B.P. '85.**—2 ozs. to 1 pint. For fomentation to painful parts.
2. **Extractum Papaveris B.P. '85.**—A brownish black extract. Hypnotic without much after-effects. *Dose.*—2 to 5 grs.
3. **Syr. Papaveris.**—1 in 2¼ nearly. A dark brown syrup. Anodyne and narcotic. *Dose.*—1 dr. Not to be given to young children.

Pharmacology and Therapeutics.

Poppy heads are used in the form of a fomentation to allay pains. The syrup is also occasionally used as a narcotic and hypnotic.

PARAFFINUM DURUM.

Hard Paraffin.

Syn.—Paraffin Wax.

Source.—Obtained by distillation from shale and separation of the liquid oils by refrigeration and purification of the solid product.

Characters.—Colourless, semitransparent, crystalline, inodorous, tasteless, solid, greasy to the touch. Sp. gr. 0·82 to 0·94. *Solubility.*—Not in water, entirely in ether and slightly in alcohol.

Non-Official Preparation.

1. **Cerosin.**—A hard white-paraffin prepared from ozokerit, or earth wax. When artificially coloured it is like **yellow wax.**

Uses.

In pharmacy it is used as a **basis** for ointments, or as an **excipient** for silver nitrate and permanganate of potash pills.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PARAFFINUM LIQUIDUM.

Liquid Paraffin.

Syn. Commercial.—Adepsine Oil, Glymol, Oleum Deelinæ, Paroleine and Chrismaline.

Source.—Obtained from petroleum after the more volatile portions have been removed by distillation.

Characters.—A colourless, tasteless, odourless, oily liquid. Sp. gr. 0·885 to 0·890. Boils not below 680°F.

Non-Official Preparations.

1. **Emulsio Petrolei cum Hypophosphitibus B.P.C.**—Liquid Paraffin 8 ozs., Acacia Gum 4 ozs., Oil of Cinnamon 24 ms., Tragacanth 2 drs., mix and add 6 ozs. of water. Triturate with calcium and sodium hypophosphites, each 192 grs., dissolved in 4 ozs. of water. Finally add water q. s. to 24 ozs. *Dose.*—1 to 4 drs.

2. **Vasogen** and **Valsol.**—This is oxygenated petroleum. A vehicle for skin medications. Dissolves camphor, chloroform, creosote, iodine, guaiacol, ichthyol, iodoform, menthol, &c.

PARAFFINUM MOLLE.

Soft Paraffin.

Syn. Commercial.—Vaseline, Petroleum Jelly, Adepsine, Chrisma, Cosmoline, Fossiline, Ozokerine, Geoline and Salvo Petrolia.

Source.—Obtained by purifying the less volatile portions of petroleum and containing soft members of the paraffin series of hydrocarbons.

Characters.—White or yellow, translucent, soft, unctuous, odourless, free from acidity or alkalinity. Melt at 95° to 102° F. *Solubility.*—Similar to hard paraffin. *Impurities.*—Fixed oils, fats and resins.

Enters into.—6 ointments and the

Official Preparation.

1. **Unguentum Paraffini.**—It should be prepared with the white variety. The yellow variety is to be used as a basis for coloured ointments.

Pharmacology and Therapeutics.

Externally.—Paraffins neither irritate the skin, nor become rancid, nor are they acted upon by acids, alkalis or oxidising agents. They are therefore superior to lard, and form a valuable **basis for ointments**, meant for **local action** only. As they are very **feebly absorbed**, they cannot be used as a basis where constitutional action of drugs is intended. Liquid paraffin is a useful **solvent** for many drugs intended for hypodermic injection. Hard paraffin is used to give consistence to softer ointments, especially in India during the hot weather. As they are non-irritant and do not undergo a change by exposure to the air, they are very useful lubricating and protecting agents in **psoriasis, xerpderma, chapped hands** and **nipples, eczema, sunburn,**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

&c. Oleum Deelinæ has given excellent results in the writer's hands in acute and chronic eczema. Petroleum is locally used with good effect in chronic rheumatism.

Internally—Cocaine, menthol, morphine, &c., are dissolved in liquid paraffin for application as a **spray** to the throat and laryngeal affections. Some of the liquid varieties are given with the hypophosphites in the form of an emulsion, but beyond their forming a bland basis, very little is known of their effects in the tissues. Prof. Shoemaker says that taken in small quantities petroleum acts as a diaphoretic, expectorant and antispasmodic. It is also said to disinfect the gastro-intestinal and respiratory tracts.

PARALDEHYDUM. Paraldehyde.

$C_6H_{12}O_3$.

Source.—A product of polymerisation of aldehyde by various acids and salts.

Characters.—A clear colourless liquid; odour ethereal; taste acrid, afterwards cool; congeals below 50° F; boils at 255·2°F. *Solubility.*—1 in 8½ of water, and with all proportions in ether and alcohol.

Action.—Hypnotic. **B.P. Dose.**—½ to 2 drs.

PHARMACOLOGY.

Externally.—Antiseptic.

Internally.—Paraldehyde is readily absorbed, and manifests its action chiefly on the cerebrum, producing calm refreshing sleep, akin to natural slumber, without after-effects and cardiac depression. It is therefore a pure **hypnotic**, like chloral hydrate, but its action is more speedy. In moderate doses, it **increases the flow of urine**, without deranging the digestive tract, or affecting the cardiac or respiratory centres, which are paralysed only by enormous doses, death taking place from respiratory failure. It is partly eliminated by the breath to which it imparts an unpleasant ethereal odour. A roseolous rash is sometimes noticed on the skin.

Paraldehyde is contained in, and is probably the principal therapeutic agent in, spiritus ætheris nitrosi. The disagreeable odour sometimes noticed in the breath of patients taking Sp. ætheris nitrosi is due to paraldehyde.

THERAPEUTICS.

Internally.—Paraldehyde may be safely used as a hypnotic in **insomnia of cardiac or respiratory diseases, mania, hysterical excitement, melancholia** and in the *later stages* of **adynamic fevers**, &c. It has been tried in asylum practice and is considered by many to be a valuable remedy. Constant use may produce toleration of the drug.

It is a very useful hypnotic for the purpose of weaning patients

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

from the **morphia habit**, as the unpleasant smell given to the breath prevents them from indulgence in it surreptitiously. It acts satisfactorily as an enema.

Several cases of rapid relief of **asthma** are recorded.

Prescribing hints.—Its pungent disagreeable taste may be disguised by mixing it with syrup and tincture of orange, or giving it in almond mixture, in syrup and peppermint water, or in capsules. Large doses should be emulsified with compound tragacanth powder. Remember that you order sufficient water to dissolve all the paraldehyde.

PAREIRÆ RADIX.

Pareira Root. N.O. *Menispermaceæ.*

Habitat.—Brazil.

Source.—The dried root of *Chondrodendron tomentosum.*

Characters.—In long, cylindrical, twisted pieces; ¾ to 2 in. in diameter; bark thin, blackish-brown with longitudinal furrows and transverse ridges and fissures. Internally yellowish or brownish-grey, with circles of porous wood and large medullary rays. Waxy when cut. Taste bitter. Odourless. *Impurities.*—Spurious Pareira and stems resembling the root.

Composition.—(1) *Pelosine* or *Buxine*, identical with berberine. (2) *Starch* and *Resin.*

Identification.—It should not be mistaken for false Pareira brava root. In the root of *Chondrodendron* there is a large well-marked central column composed of wedges diverging from a common axis, round which are arranged a few concentric rings intersected by wedge shaped rays, which are often irregular, scattered and indistinct. The axis not often centric. In *Cissampelos Pareira* the root and stem are nearly alike in structure, and in transverse section there are concentric rings.

Incompatibles.—Ferric salts, lead salts and tincture of iodine.

Action.—Diuretic, tonic and sedative to the mucous membrane of the bladder.

Official Preparation.

1. **Extractum Pareiræ Liquidum.**—Extractives 25 p.c. A black liquid. **B.P. Dose.**—½ to 2 drs.

Pharmacology and Therapeutics.

Internally.—The actions of pareira are not well understood. It is considered to be a **mild bitter tonic**, improving appetite and giving tone to the bowels. It is said to be a gentle **laxative**. The active principle is eliminated by the kidneys which it stimulates, and thus acts as a **diuretic**. During its passage, pelosine soothes and tones the mucous membrane of the genito-urinary tract. It is therefore very useful in **cystitis, hæmorrhage** from the **bladder, suppurative renal diseases**, and sometimes in **gonorrhœa** and **gleet**. Hence its actions and uses closely resemble those of buchu. Strange to say, it cannot check bleeding from other organs. In order to get the full effects,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the liquid extract must be given in big doses (2 drs.) with liq. potassæ and hyoscyamus.

PEPSINUM. Pepsin.

Source.—An enzyme obtained from the mucous lining of the fresh and healthy stomach of the dog, sheep or calf.

Characters.—A yellowish-brown or white powder, or pale-yellow translucent grains or scales. Odour faint, taste slightly saline. Should be free from any putrescence. *Solubility.*—Moderately in water, and 1 in 100 of alcohol (90 p. c.).

Test.—Should dissolve 2500 times its weight of hard boiled white of egg, with water acidulated with hydrochloric acid.

Incompatibles.—Alcohol, tannin, alkaline carbonates.

Action.—A digestive adjuvant. **B.P. Dose.**—5 to 10 grs.

Official Preparation.

1. **Glycerinum Pepsini.**—5 grs. in 1 dr. A solvent for diphtheritic membrane. **B.P. Dose.**—1 to 2 drs.

Non-Official Preparations.

1. **Liquor Pepticus** (Benger's).—A solution of gastric ferments in weak alcohol. *Dose.*—1 to 2 drs.
2. **Pepsina Amylacea.** *Syn.*—*Pepsine Acide Amylacée ou Poudre Nutritive.* (French).—*Dose.*—5 to 15 grs.
3. **Pepsinum Saccharatum U. S.**—Pepsin U. S. 1, Sugar 9. *Dose.*—1 to 1½ gr.
4. **Pepsin Tablets.**—3 grs. in each. *Dose.*—1 or 2 with meals.
5. **Vinum Pepsinæ. B. P. C.**—Pepsin 320 grs. Hydrochloric acid 2 drs., Glycerin 1 oz., Sherry *q. s.* to 1 pint. *Dose.*—1 to 2 drs.
6. **Peptone.** (Merck).—A light brown powder soluble in water, A nutrient for invalids, given in enema. *Dose.*—½ to 1 oz.

Note.—Chapoteaut of Paris prepares pepsine perles made from the stomach of the sheep. These can safely be given to Mahomedan patients who object to taking pepsin porci.

Pharmacology and Therapeutics.

Externally.—Medicinal pepsin can convert outside the body, in the presence of warmth, moisture and acidity, **proteids** (albumen, fibrin, &c.) into **peptones**, and this action is taken advantage of in predigesting food for administration by the mouth or rectum; but the taste of the peptonised product becomes so unpalatable, that it cannot be ordinarily prescribed. As the rectum has very feeble digestive powers, **peptone** and peptonised food form a valuable **nutrient enema**, in a case of rectal feeding. By the following method meat can be peptonised:—Take clean lean meat 8 lb., reduce it to a fine pulp, add water 6 lbs. acidulated with hydrochloric acid ·2 p. c, and containing pepsin 2 drs. Digest in a porcelain digester for 5 or 6 hours at 120°F. with sodium bicarbonate, boil and filter. Lastly evaporate the filtrate on a water bath to the consistence of a soft extract. 30 grs. of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

this extract with 40 grs. of cacao butter makes a **peptonised meat suppository**, which may be introduced with advantage into the rectum. Glycerinum pepsini has been applied to **diphtheritic false membranes** to cause their solution.

Internally.—A similar process within the stomach, as seen outside, takes place when pepsin is given by the mouth. Though it attacks the albuminoid principles of food like *trypsin*, yet the actions of these two ferments are not identical. Pepsin digests egg albumen more readily than milk, whereas the pancreatic extracts more readily the latter. Pepsin is therefore a **valuable agent in helping the digestion** of those, in whom the secretion of the **gastric juice is deficient** from —

(1). Disease of the gastric follicles, as atrophy or dilatation.

(2). Excessive secretion of mucus, as chronic gastric catarrh, alcoholism.

(3). Deficient circulation, as in anæmia, general debility, old age.

(4) The irritable conditions of the stomach due to ulcer, cancer, &c In cases of gastric ulcer, it is to be given with caution as pepsin might reach the liver unaltered. Pepsin is recommended in **diarrhœa** of children, and some forms of **vomiting** caused by imperfect digestion. It is useless for the digestion of the carbo-hydrates and fatty food.

Prescribing hints.—Pepsin may be given in powders, pills, cachets, tablets or capsules. Many of the market preparations are worthless, and are therefore to be tested. Being reliable preparations Glycerinum pepsini and Benger's Liquor Pepticus are the best to use. It should be given with, or directly after, meals, either combined with, or followed by, a dose of Acid. Hydrochlor. dil. See also page 89.

PHENACETINUM. Phenacetin.

$C_2H_5O{\cdot}C_6H_4{\cdot}NHCOCH_3$.

Syn. B.P.—Para-acet-phenetidin.

Source.—Produced by the interaction of glacial acetic acid and para-phenetidin, a body obtained from para-nitro-phenol.

Characters.—White, tasteless, inodorous, glistening, scaly crystals, neutral; melts at 275°F. *Solubility.*—1 in 1700 of cold water, 1 in 50 of boiling water, 1 in 21 of alcohol (90 p.c.), and glycerin. *Impurities.*—Acetanilide, para-phenetidin.

Action.—Analgesic, antipyretic. **B.P. Dose.**—5 to 10 grs. As an antineuralgic 15 to 20 grs. Up to 5 grs. to children. In cachets or suspended in water with mucilage.

Non-Official Preparations.

1. **Amygdophenin.**—A derivative of amygdalic acid and para-amidophenol. A greyish-white crystalline powder, sparingly soluble in water. Anti-rheumatic and analgesic. *Dose.*—8 to 15 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. **Kryofin.**—A condensation product of para-phenetidin and methyl-glycolic acid. Analgesic and antipyretic, sometimes causing severe sweating. *Dose.*—8 to 15 grs.

3. **Apolysin.** *Syn.—Mono-phenetidin Citrate.*—A yellowish-white crystalline powder soluble in water, acting like phenacetin. It is harmless even when given in 2 drs. daily. But its analgesic property is inferior to that of phenacetin. Powerfully antiseptic. *Dose.*—10 to 30 grs. or 8 grs. in suppository with cocoa-butter.

4. **Citrophen.**—A dibasic para-phenetidin citrate. Acts like phenacetin, but the sweating is excessive. *Dose.*—3 to 8 grs.

5. **Lactophenin.**—A derivative of lactic acid and phenetidin. A white, bitter, crystalline powder. Analgesic, antipyretic, hypnotic. Found useful in typhoid fever, erysipelas, migraine, &c. *Dose.*—5 to 15 grs.

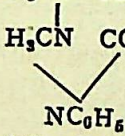
6. **Malakine.** *Syn.—Salicyl-para-phenetidin.*—Insoluble in water. Light yellow silky needles. Anti-rheumatic, analgesic, antipyretic, without any untoward effects. Sometimes acts as a vermifuge. *Dose.*—10 to 20 grs.

7. **Phesin.**—A sulpho-derivative of para-phenetidin. In brownish-yellow, amorphous powder, soluble in water. Acts like phenacetin, without untoward effects. *Dose.*—5 to 10 grs.

8. **Phenocoll Hydrochloridum.**—A derivative of glycocoll and phenetidin. Colourless crystals, soluble in water. Analgesic, antiperiodic, and intestinal antiseptic. Useful in acute rheumatism, malaria, typhoid fever, &c. Externally as a substitute for iodoform. *Dose.*—5 to 10 grs. **Salocoll** is a phenocoll salicylate given in 15 to 20 grs.

9. **Triphenin.** *Syn.—Propionyl-phenetidin.*—A derivative of propionic acid and phenetidin. Colourless, crystalline, sparingly soluble in water. Action like phenacetin. *Dose.*—5 to 10 grs.

PHENAZONUM. Phenazone.



Syn.—Antipyrine. Phenyl-dimethyl-isopyrazolone.

Source.—Obtained from phenyl-hydrazine by interaction with aceto-acetic ether, and the subsequent interaction of the resulting phenyl-methyl-iso-pyrazolone with methyl iodide.

Characters.—Colourless, inodorous, scaly crystals. Taste bitter. Melts at 235·4°F. *Solubility.*—1 in 1 of water, 1 in 1½ of alcohol (90 p.c.) or of chloroform, 1 in 40 of ether.

Incompatibles.—Sp. æther. nitrosi, nitrites. Tannic acid in solution, cinchona preparations, copper sulphate, iodine, acids, alkalis, potassium permanganate, corrosive sublimate, sulphate, iodide, chloride of iron, and strong solution of chloral hydrate. Powdered phenazone liquefies when rubbed with butyl chloral hydrate, sodium salicylate and *B*-naphthol.

Action.—Analgesic, antipyretic, nervous sedative.

B.P. Dose.—5 to 20 grs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparations.

1. **Effervescent Antipyrine.**—5 to 10 grs, in 1 dr. An agreeable preparation. *Dose.*—One teaspoonful or more.
2. **Antipyrine Tablets.**—5 grs. in each.
3. **Ferripyrin** *Syn.—Ferropyrin.*—A compound of antipyrine 2, in ferric chloride, useful in chlorosis and anæmia. 1 p. c. solution as gonorrhœa injections. Saturated solution, hæmostatic and styptic. *Dose.*—3 to 8 grs.
4. **Hypnal.**—see page 325.
5. **Iodopyrin**—see page 462.
6. **Migranin.**—see page 290.
7. **Pyramidon.**—A methyl derivative of antipyrine. Yellowish-white crystals, soluble in water. Analgesic, antipyretic. *Dose.*—5 to 20 grs. in solution.
8. **Salipyrin.** *Syn.—Antipyrine Salicylate.*—White, sweetish crystals, soluble in water. Analgesic, anti-rheumatic. *Dose.*—15 to 20 grs.
9. **Tolipyrin.** *Syn.—Tolylantipyrine, Paratolyl-dimethyl-pyrozolone.*—Action and dose, same as phenazone but is cheaper.
10. **Tolysal.**—A salicylate of tolypyrin in small white crystals, sparingly soluble in water. Antipyretic, analgesic *Dose.*—5 to 30 grs.
11. **Tussol.** *Syn.—Antipyrine Amygdalate.*—White granular crystals, soluble in water. Said to be useful in whooping cough. *Dose.*—5 to 15 grs.; 1 gr. for a child 1 year old.
12. **Anilipyrin.**—Obtained by fusing antipyrine 2, with antifebrin 1. Possesses actions of both. *Dose.*—10 to 15 grs
13. **Acetopyrin.**—A white crystalline powder, being a combination of phenazone and acetic acid. Anti arthritic remedy. *Dose.*—5 to 15 grs.
14. **Acetophenone.** *Syn.—Hypnone, Methyl-Phenyl-Acetone.*—A colourless liquid, used as a hypnotic and in nervous affections, uncertain in its action. *Dose.*—1½ to 5 ms.
15. **Benzanilide.** *Syn.—Phenyl-Benzamide.*—Small white shining scales without smell or taste. Resembles acetanilde in its action, specially useful for children. *Dose.*—3 to 12 grs.
16. **Chinoline Tartras.**—The tartrate of chinoline which is prepared by the oxidation of nitrobenzine and aniline. White glistening crystals, without smell, but with a nauseous taste. A powerful antipyretic, used in enteric and remittent fevers and in paroxysmal neuralgia. *Dose.*—5 to 10 grs. (in cachet or with syrup of orange).
17. **Exalgin.** *Syn.—Methyl acetanilide.*—Colourless acicular crystals. Antipyretic and analgesic. Chiefly used in migraine, sciatica and neuralgias. *Dose.*—½ to 2 grs.

Pharmacology of Acetanilide, Phenazone and Phenacetin.

As the actions and uses of these drugs closely resemble one another, one description for all will suffice.

Externally.—Both phenazone and acetanilide are **local hæmostatics**, but the latter is also an **antiseptic.**

Internally. **Gastro-intestinal tract.**—No effect.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Blood is not affected by the ordinary doses, but its colour is changed by large doses, owing to the formation of methæmoglobin. The red blood corpuscles are broken up and the movements of the white-blood corpuscles are arrested.

Heart.—The heart is depressed, probably by its sedative influence on the cardiac muscle. Acetanilide is the most depressant, next comes phenazonum, and phenacetin has little or no depressant action.

Blood Vessels.—Acetanilide and phenazone contract the blood vessels, by acting directly on their muscular fibres. These are therefore **hæmostatics**, phenazone being more energetic than the other. The blood pressure is heightened at first, and is lowered subsequently from cardiac weakness.

Respiration.—The respiratory force is diminished only by toxic doses.

Kidneys.—They slightly increase the flow of urine, urea and uric acid. Large doses cause hæmoglobinuria. Phenazone is quickly excreted. Acetanilide is said to be excreted as aniline.

Skin.—Papular, erythematous, or urticarial rashes are observed at times. They may produce a slight diaphoresis in health, but a copious one in pyrexia. Therefore they are **diaphoretics.**

Temperature.—They only slightly reduce the temperature of healthy persons, but are **powerful antipyretics.** This action is mainly due to direct action on the heat-producing centre in the corpus striatum and partly to diaphoresis.

Nervous system.—They are **powerful analgesics.** Acetanilide and phenazone are said sometimes to cause convulsions and motor paralysis.

Toxic action.—Large doses cause great prostration, sometimes vomiting, weak irregular pulse, slow respiration and sweating. In toxic doses these symptoms are aggravated, leading to profuse sweating, cyanosis, collapse and death. Sometimes a rash appears on the skin. Poisoning may occur from phenazone and acetanilide. The writer had a case of poisoning from 30 grs. of phenacetin. Cyanosis of the face, mostly of the lips, hands and feet, and a slight depression were the only prominent symptoms.

Antidotes.—Warmth to the surface, stimulants, strychnine and atropine hypodermically, and oxygen inhalation.

Actions of Phenazone and Phenacetin compared.—Phenazone is the best in respect of the efficacy, rapidity and certainty of its action, while phenacetin is safe, and its action more lasting, never producing subnormal temperature or collapse. Phenacetin has also a soothing and soporific action. Both of them cause profuse sweating *but do not shorten fever.*

THERAPEUTICS OF ACETANILIDE, PHENAZONE AND PHENACETIN.

Externally.—Acetanilide and phenazone are occasionally used as a dusting powder, or as an ointment (20 grs. to 1 oz.) for

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

chronic ulcers and eczema. A 10 p. c. solution of phenazone locally applied, stops **epistaxis**. A more concentrated solution may be used to arrest **post partum hæmorrhage** Phenazone hypodermically (5 to 10 grs. in water) relieves the pains of **sciatica, lumbago, dysmenorrhœa, biliary and renal colic**, &c. A 50 p. c. solution in the same way, may be used as a **local anæsthetic**. The smarting caused by the subcutaneous injection may be relieved by combining it with cocaine. The local sores it produces are a drawback to its use.

Internally.—Acetanilide is rarely used nowadays. As an **anæsthetic**, a 30 or 50 p. c. solution of phenazone may be locally applied in sore-throat.

As **antipyretics** all three are used to reduce **feverheat**, but phenacetin, being the safest, is prescribed most frequently. They take about 2 hours to bring down the temperature but phenazone and acetanilide do it most rapidly. To maintain the reduced temperature they require to be repeated every 4 or 6 hours, and this sometimes leads to dangerous symptoms, on account of their depressing influence on the heart. They cannot control the duration of fever. As soon as the effects are over, the fever rushes up again. Hence many physicians are averse to using them as **antipyretics**, as a routine treatment, but they are really very useful agents when in an acute disease we want to reduce the fever immediately. In **hyperpyrexia** they cannot be relied upon. Both phenazone and phenacetin have been given in every manner of **febrile condition with a high temperature**, such as typhus, remittent, intermittent, sunstroke, exanthemata, erysipelas, rheumatism, pneumonia, phthisis, influenza, puerperal fever, but with unsatisfactory results. The modern doctrine of fever is that it is a protective process. We should therefore never use drugs which check heat production, but should rely, for the reduction of temperature, upon those means which promote the dissipation of heat without influencing its production.

As **analgesics** all three may be given to relieve pain, but phenazone is the most powerful in so doing. For reasons already stated, phenacetin will have a preference. There is hardly any pain, which can not be alleviated by phenazone. 10 to 15 grs. given hourly for 3 or 4 doses act like a charm in almost every from of **headache** and **migraine**. Phenacetin does it equally well in 5 gr. doses. Moreover, the pains of **ataxy, sciatica, angina, internal aneurism, dysmenorrhœa** are soon cut short by these drugs. In pleurisy they not only cut short the attack, but relieve the stitch and aid the absorption of the effused fluid.

Phenacetin, in 1 gr. doses, is a useful hypnotic in the febrile diseases of children.

As a **nervine sedative**, phenazone is occasionally used in **epilepsy, chorea, nocturnal emissions, laryngismus stridulus, asthma, sea-sickness, enuresis**, &c.

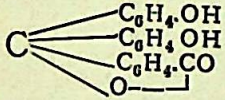
CC-0. Mumukshu Bhawan Varanasi Collection. Digitized by eGangotri

As a **hæmostatic**, it is given in hæmoptysis, and it is said to rapidly reduce the amount of sugar eliminated in **diabetes**.

Prescribing hints.—All three may be given in powders cachets, or capsules. Phenazone being soluble in water can be given in peppermint water, which disguises its taste, while the others can be suspended by compound tragacanth powder. Sometimes they may be given with advantage in brandy or whisky. Phenazone relieves pain quicker when subcutaneously injected, or they may be administered *per rectum* if necessary. On account of a long list of incompatibles, phenazone is better given alone.

Note.—Caffeine is rendered soluble in one-half of water by the addition of an equal quantity of antipyrine; and quinine hydrochloride 2 parts, with antipyrine 1 part, will dissolve in 5 parts of water. Without the addition of antipyrine, 64 parts of water would be necessary to dissolve 2 parts of quinine hydrochloride.

PHENOLPHTHALEIN.



Syn.—Purgen, Dihydroxy-phthalophenon.

Source.—Obtained by the interaction of Phenol and Phthalic anhydride.

Characters.—A crystalline substance, soluble 1 in 10 of alcohol (90 p.c.), but only in 600 of water.

Action.—Purgative. *Dose.*—½ to 4 grs.

Actions and Uses.

Phenolphthalein in neutral or alkaline solution is absolutely colourless, but on the faintest trace of acidity it turns delicate pink For this reason it was introduced into the B.P. as a test in the preparation of neutral solutions. Clinically it is used as an indicator in combination with Decinormal Soda Solution in the process of estimating the total acidity of gastric contents. Under the fancy name of "*Purgen*," it has recently been introduced as a **purgative**, being specially useful in cases where prompt action is required as in **jaundice**. For ordinary patients ½ to 3 grs. is a sufficient dose, but patients confined to bed may require as much as 10 grs. It has no action on the kidneys and is very safe and efficient in its action, but its use is contra-indicated in cases where there is a tendency to piles.

PHOSPHORUS.

Phosphorus. P.

Source.—A solid non-metallic element obtained from calcium phosphate.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—A semi-transparent, wax-like solid, emitting white vapours and luminous in the dark; ignites in the air. *Solubility.*—Insoluble in water; 1 in 25 of chloroform, 1 in 350 of absolute alcohol, 1 in 80 of olive oil and of ether; 2 in 1 of carbon bisulphide, 1 in 60 of oil of turpentine. Also in melted fats.

Action.—Nervine tonic and general stimulant.

B.P. Dose.—$\frac{1}{100}$ to $\frac{1}{50}$ gr. in pill or solution.

Enters into.—The preparation of Calcii Hypophosph., Acid phosph. concent. and the

Official Preparations.

1. **Oleum Phosphoratum.**—1 p.c. A clear straw-coloured oil. For its unpleasant taste, it is rarely prescribed. **B.P. Dose.**—1 to 5 ms.

2. **Pilula Phosphori.**—1 in 90. (see p. 89.) **B.P. Dose.**—1 to 2 grs. *i.e.* $\frac{1}{100}$ to $\frac{1}{25}$ gr. of phosphorus.

Non-Official Preparations.

1. **Elixir Phosphori. B.P.C.**—Tr. Phosph. Co. 1, Glycerin 4: mix and agitate. Palatable and well borne by the stomach. *Dose.*—15 to 60 ms. in water. Contains $\frac{1}{75}$ gr. phosphorus in 1 dr.

2. **Perles of Phosphorated oil.**—Contains phosphorus $\frac{1}{100}$, $\frac{1}{50}$ and $\frac{1}{25}$ gr. in each *Dose.*—1 after meals.

3. **Tr. Phosphori Comp. B.P.C.**—Contains $\frac{1}{10}$ gr. of phosphorus in 1 dr. Dissolve Phosphorus 12 grs. in chloroform 2½ ozs. within a stoppered bottle on a water bath, and then add ethylic alcohol 12½ ozs. shake well. *Dose.*—3 to 12 ms. Preserve from light.

4. **Zinci Phosphidum. U.S.**—A grey crystalline powder. Recommended as a substitute for phosphorus. *Dose.*—$\frac{1}{200}$ to $\frac{1}{3}$ gr.

Pharmacology.

Phosphorus has a specially interesting physiological action, but its therapeutic value is unfortunately limited. As a poison it is important.

Externally.—Undiluted phosphorus is a strong local irritant and caustic.

Internally.—In its solid form it has the same local action.

Blood.—It is absorbed into the blood partly unchanged, and partly as an oxidised product, phosphorus or phosphoric acid. This oxidation possibly occurs at the expense of the oxyhæmoglobin. Many authorities do not believe this latter theory.

Stomach and liver.—In very minute doses, it is said to sharpen the appetite, and in moderate doses it increases the development of the connective tissue of the stomach and liver and induces a sort of chronic inflammation of the organs, thus atrophy of the gastric follicles and cirrhosis of the liver are the results. The glycogenic function of the liver too is greatly reduced, and fatty degeneration ensues. In toxic doses, it is a gastro-intestinal irritant, producing vomiting and purging, the vomited matters having a garlic odour. These symptoms do not

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

follow *immediately after administration, but may be delayed for hours or days.*

Bones.—When continued long in such minute doses as not to affect the stomach or liver, there is an increased osseous deposit, and the cancellous tissue becomes converted into compact bone. These changes are not due to the excess of phosphates produced in the blood, but to the stimulation of the cell growth by the drug itself.

Nervous system.—It is said to act as a **tonic** and **restorative** to the nervous system, supplying it with nutrition, but it is difficult to understand how it can do this, when it arrests oxidation, except on the supposition, that it does so by stimulating cell growth, as in the case of bones. It is popularly supposed to excite the reproductive centres in the spinal cord, and is therefore regarded by many as an **aphrodisiac**, but the best authorities have now entirely discarded it for this purpose.

Metabolism.—In large doses, it distinctly increases the nitrogenous products, such as urea, leucin, tyrosin, &c., raises temperature, reduces absorption of oxygen and excretion of carbonic acid, and leads to **fatty degeneration** of the glandular, muscular and epithelial protoplasm throughout the body. The urea, &c, being soluble, are excreted by the kidneys, whose action they increase, but the insoluble products, such as fats, and oils are deposited in the various organs.

Acute toxic action.—Acute poisoning may occur from swallowing rat-paste or lucifer match-heads. Besides gastro-enteritis already described, there is considerable prostration, and occasionally collapse and death. Generally, these symptoms come on in a mild form, and the patient does well for a few days. Then, after an interval, jaundice is noticed, with a tender enlarged liver. The jaundice soon deepens ; vomiting and purging of dark coloured blood set in, temperature first rises and then falls ; the pulse becomes weak and rapid ; the skin cold and clammy ; and the urine scanty, high-coloured, and albuminous. Muscular twitchings, convulsions or coma supervene, terminating in death. **Fatty degeneration of the liver,** with general ecchymoses and hæmorrhages, are the common P. M. appearances.

Antidotes.—Stomach-pump, copper sulphate is the appropriate emetic (see p. 376). It should be given in 3 grs. doses every 5 minutes till vomiting takes place, and then 1 gr. every quarter of an hour as an antidote. If rejected, give it with morphine solution (10 ms.). Ozonised oil of turpentine 30 ms. every half hour. This acts by converting the phosphorus into hypophosphoric acid. The French turpentine is the best. *New* turpentine is *worse than useless.* Mag. Sulph. ½ oz. as a purgative, and demulcent drinks may also be given. Avoid fats, butter and oils which dissolve phosphorus.

Chronic toxic action.—Chronic poisoning is rare, *and occurs only in those workmen who are exposed to the fumes* of phosphorus. Gastro-enteritis, fatty degeneration, **necrosis of the jaw,** general tuberculosis are the prominent symptoms. It is asserted that phosphorus fumes attack the bone through carious teeth or spongy gums, but this effect is not produced by its internal administration. Oil of turpentine is an antidote.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

THERAPEUTICS.

Internally.—The use or phosphorus is limited.

As a nervine tonic, it has been given in **nervous exhaustion** during convalescence from acute illness, **over-taxation of the brain** from prolonged strain and overwork, and such diseases as are characterised by **softening** or **atrophy** of the **nerve centres.** It is occasionally recommended in functional impotence and in many other nervous disorders, such as neuralgia, melancholia, adynamic conditions following typhoid and remittent fevers, pneumonia, and neurasthenia, &c, but the student is advised to avoid the use of this and all other so-called *aphrodisiacs*, which, as a rule, do more harm than good.

As a restorative or a stimulant to the cell growth, it has been given in affections dependent on malnutrition, such as **anæmia, leucocythæmia,** with occasional success. Dr. Kassowitz obtained very good results in the rickets of children ; the dose being $\frac{1}{120}$ to $\frac{1}{30}$ gr. *per diem* for a child weighing 12 lbs. But Whitla apprehends danger of the bones hardening in their bent condition. It is no doubt useful in **ununited fractures,** *especially during pregnancy*, and in **osteo-malacia.** Cases of **tubercular meningitis, diabetes,** and **lymphadenoma** have improved under treatment by this drug.

Prescribing hints.—All phosphorus preparations should be given with caution. It is safe to commence with $\frac{1}{80}$ gr. dose, but in sexual debility large doses such as $\frac{1}{30}$ to $\frac{1}{20}$ gr. are necessary at times. The B.P. oil is best administered with cod-liver oil (30 to 40 ms. in 6 ozs.) in 1 dr. doses. Gelatin capsules or perles containing oil are elegant. Elixir phosphori is the best preparation. Phosphorus is to be given after meals. Sometimes it gives rise to unpleasant eructations.

In **neurasthenia** the following prescription forms a very good combination.—Ferri Redacti .2 grs., Strychnine $\frac{1}{30}$ gr., Pil. Phosph. 2 grs., m. ft. Pil 1 mitte. 30. Twice daily after meals.

CALCII HYPOPHOSPHIS.

Calcium Hypophosphite. $Ca(PH_2O_2)_2$.

Source.—Obtained by the interaction of phosphorus, calcium hydroxide and water. $3Ca(HO)_2+8P+6H_2O=3Ca(PH_2O_2)_2+2PH_3$.

Characters.—A white, crystalline, pearly salt. Taste bitter, nauseous.

Solubility.—1 in 8 of water, insoluble in alcohol (90 p.c.).

Action.—Nervine tonic. **B.P. Dose.**—3 to 10 grs.

NON-OFFICIAL PREPARATIONS.

1. **Syr. Calcii Hypophosph. B.P.C.**—1 gr. in 1 dr. Calcium Hypophosph. 160 grs., Distilled Water 9 ozs., dissolve and filter. Add and dissolve sugar 16 ozs., with the aid of gentle heat. After cooling,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

add Hypophosphorous Acid 20 ms., and Distilled Water *q.s.* to 20 ozs. *Dose.*—1 to 4 drs.

2. **Saccharated Wheat-Phosphates.**—The organic phosphates and cerealin of the bran, combined with milk sugar, are useful for weak and rickety children to aid the assimilation of food and such drugs as iron. *Dose.*—½ tea-spoonful or more as sugar with food.

SODII HYPOPHOSPHIS.

Sodium Hypophosphite. $NaPH_2O_2$.

Source.—Obtained by the interaction of sodium carbonate and calcium hypophosphite. $Na_2CO_3 + Ca(PH_2O_2)_2 = 2NaPH_2O_2 + CaCO_3$.

Characters.—A white, granular, deliquescent salt, taste bitter, nauseous. *Solubility.*—1 in 1 of water.

Action.—The same as of calcii hypophosphis.

B.P. Dose.—3 to 10 grs.

PHARMACOLOGY AND THERAPEUTICS OF CALCIUM AND SODIUM HYPOPHOSPHITES.

Internally.—The actions of these salts resemble those of phosphate of lime, but not of free phosphorus. They are probably converted into phosphates in the stomach. Their efficacy in **phthisis** has been doubted, but there is evidence to shew that in the first stage they are more useful than in the second or third. In fact, if any benefit is derived from them, it is due to their **general alterative** effects, rather than to their specific action on the disease. They give better results in **chronic bronchitis** with emaciation, profuse expectoration, and sweating in young individuals. They may be used in the same class of diseases in which phosphate of lime is indicated. Parrish's Chemical food, Fellow's syrup, Syr. Calcii Lactophosh. B.P. or Glycerophosphate of lime are valuable preparations to select from.

PHYSOSTIGMATIS SEMINA.

Calabar Bean. N. O. *Leguminosæ.*

Syn.—Ordeal Bean.

Habitat.—Western Africa.

Source.—The ripe seeds of *Physostigma venenosum.*

Characters.—Large, reddish-brown, oblong-reniform: 1 in. long, ¾ in. broad, ½ in. thick, with a broad black furrow extending the entire length of the curved margin. Testa hard, thick, rough, enclosing two starchy cotyledons, between which there is a cavity. No odour. No taste.

Identification.—Easily identified, no other drug in the B.P. resembles them. Student should also note colour, size and the black furrow.

Composition.—(1) *Physostigmine* or *Eserine* is the chief constituent. (2) *Calabarine*, a secondary alkaloid, antagonistic in action to physostigmine.

Action.—Antispasmodic, myotic and expectorant.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparation.

1. **Extractum Physostigmatis.**—A dark brown firm extract. **B.P. Dose.**—$\frac{1}{4}$ to 1 gr. in pill.

Non-Official Preparation.

1. **Tinctura Physostigmatis. B.P.C.**—Calabar bean 1, Alcohol (90 p. c.) 5. *Dose.*—5 to 15 ms.

PHYSOSTIGMINÆ SULPHAS.

Physostigmine Sulphate.

$$(C_{15}H_{21}N_3O_2)_2,H_2SO_4,XH_2O.$$

Syn. B.P.—Eserine Sulphate.

Source.—The sulphate of an alkaloid obtained from calabar bean.

Characters.—Yellowish-white, minute crystals, becoming red by light and air; deliquescent; taste bitter. *Solubility.*—Very soluble in water and alcohol.

B.P. Dose.—$\frac{1}{60}$ to $\frac{1}{30}$ gr.

Official Preparation.

1. **Lamellæ Physostigminæ.**—Contains $\frac{1}{1000}$ gr. of physostigmine sulphate in each. Used to contract the pupil.

Non-Official Preparations.

1. **Guttæ Physostigminæ cum Cocaina.** R. O. H.—Physostig. Sulph. and Cocaine Hydrochloride 1 to 100.
2. **Injectio Physostigminæ Sulph. Hypodermica.**—4 grs. to 1 oz. *Dose.*—1 to 4 ms.
3. **Hypodermic Tablets.**—$\frac{1}{100}$ gr. in each.
4. **Physostigminæ Hydrobromidum.**—In fibrous masses, soluble in water. *Dose.*—$\frac{1}{60}$ to $\frac{1}{30}$ gr.
5. **Physostigminæ Salicylas.** *Syn.—Eserine Salicylas.*—In colourless, shining, acicular crystals, soluble 1 in 1 of water, which becomes red after a few days. *Dose.*—$\frac{1}{60}$ to $\frac{1}{30}$ gr.

Pharmacology.

Externally.—Only used in ophthalmic practice.

Eye.—Applied locally to the conjunctiva, physostigmine is absorbed and produces the following changes,—(1) **contraction of the pupil**; (2) **spasm of accommodation**, preceded briefly by an increased accommodation for near objects; and (3) **diminished intra-ocular tension.** All these actions are due to the *direct stimulation of the circular fibres of the iris and ciliary muscles*, but not to the paralysis of the sympathetic, as is shown by the following observations :—

1. The pupil contracted by physostigmine will dilate if suddenly shaded, or if the cervical sympathetic is stimulated.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

2. The contraction produced by physostigmine is much greater than that caused by section of the sympathetic.

It follows therefore that the myosis is not due to paralysis of the sympathetic, but to stimulation either of the oculo-motor nerve-endings or the sphincter itself. *The following considerations show that it is the sphincter itself that is concerned.*—

1. The pupil dilated by atropine can be made to contract with physostigmine.

2. Atropine paralyses the nerve-endings but not the muscle itself. Physostigmine can therefore only act on the latter.

3. Myotic poisons which act only on the nerve-endings (as pilocarpine, muscarine, &c.) do not counteract the mydriasis caused by atropine.

Internally. **Mouth.**—Physostigmine **increases the salivary secretion** by directly stimulating the salivary cells. (See page 122.) This increased salivation is not checked by atropine, but it stops as soon as the contraction of the blood-vessels begins, which no doubt reduces the circulation in the glands.

Stomach and intestines.—Physostigmine is readily absorbed by the stomach. Small doses produce colic, retching, or vomiting and large doses diarrhœa. This is caused by the increased and irregular peristalsis, from the direct stimulation of the involuntary muscular coats, which become strongly contracted and anæmic.

Heart and circulation.—Physostigmine enters the blood unchanged. In small doses it increases the **contractile force** of the heart, while in toxic doses it **arrests it in diastole,** due to stimulation and subsequent depression of the cardiac centre. In the same way excitability of the peripheral terminations of the vagus in the heart is increased. In large doses opposite results are observed, whereby **slowing of the heart's beats** occurs. Thus on the whole, the **pulse beats forcibly but slowly.**

The blood pressure too rises from the increased contractile force of the heart, aided partly by, (*a*) the contraction of the arteries, and partly by, (*b*) the tetanic contraction of the intestinal tract.

Respiration.—This is at first **quickened** but soon **depressed.** Death happens from asphyxia. The acceleration is caused (1) by the paralysis of the respiratory centre of both the medulla and the cord, (2) by the stimulation of the peripheral terminations of the vagus in the lungs, and by the (3) spasmodic contraction of the bronchial tubes.

Brain.—Consciousness is not affected even by toxic doses, and the mind remains clear to the last. **The pupils may be contracted** but not, as a rule, to any great extent.

Medulla.—The respiratory and cardiac centres are affected.

Spinal cord.—Physostigmine produces most characteristic symptoms here. It markedly **depresses the anterior cornua**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of the cord, thereby **abolishing reflex excitability** and producing **motor paralysis**. There may be a slight **increase of reflex excitability** in the beginning. The **posterior cornua** of the cord are affected to a less extent later on, and consequently there is some loss of sensation.

Muscles.—Marked fibrillar contractions of the skeletal muscles are often seen after death. This is due to their direct stimulation by the poison, for it takes place also when the nerve-centres have been paralysed by chloral, or the motor nerves by curare, or when the nerves have been divided. The sensory nerves remain unaffected. The involuntary muscles of almost every organ, such as the stomach, intestines, bladder, heart, arteries spleen, uterus, iris, &c., are more or less stimulated. Physostigmine acts directly upon the muscle-substance and not upon the nerve endings.

Secretions.—Not only saliva, but sweat, tears and buccal mucus are also increased, this is due to direct stimulation of the glandular protoplasm.

Elimination.—Physostigmine is excreted by the liver and salivary glands, not by the kidneys.

Antagonists.—Atropine, chloral, strychnine and morphine.

Antidotes.—Poisoning by calabar bean is rare. Emetics or pump. Tannin. Atropine $\frac{1}{100}$gr. hypodermically till the pupils dilate well. Chloral and strychnine are also used, artificial respiration overcomes respiratory trouble.

THERAPEUTICS.

Externally. **Eye.**—Eserine is chiefly used in **ophthalmic practice.** Guttæ or lamellæ physostigminæ may be used (1) to contract the pupil in photophobia, and diminish the amount of light falling on a sensitive retina; (2) to break up adhesions in iritis; (3) to prevent prolapse of the iris after corneal wounds, ulcers or perforations; (4) to reduce intra-ocular tension in glaucoma and perforating keratitis; (5) to stimulate the paralysed ciliary muscles and iris; (6) to counteract the effects of atropine; and (7) in detachment of the retina.

As a **motor paralyser** calabar bean is chiefly used in **tetanus.** Dr. Fraser who brought the drug prominently before the profession, recommends its use at the very outset. It must be boldly pushed till the physiological effects are developed, in fact a little short of poisoning. If the patient cannot swallow, it may be given by the rectum or subcutaneously. The patient should be watched. It is used with more or less benefit in many other convulsive diseases, such as **chorea, paralysis agitans, acute mania.** Though physostigmine is an antidote to strychnine, atropine and chloral it is rarely used in **poisoning by these drugs.**

As a **stimulant to the involuntary muscles** it may be

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

given in constipation, bronchitis, and atony of the bladder, but it is rarely used for this purpose.

PICRORHIZA. Picrorhiza.

N.O. *Scrofulariaceæ.* (*Ind. and Col. Addendum*).

Syn. I. V.—*Kutki, Katki.* Beng., Hind. *Katukâ*, Sans.

Habitat.—India and Eastern Colonies.

Source.—The dried rhizome of *Picrorhiza Kurroa.*

Characters.—In short pieces, about ¼ in. in diameter, as thick as a goose quill, tapering downwards, beset with prominent scars and remains of the rootlets. The large upper part is beset with dark greyish brown scales. Taste bitter.

Composition.—(1) A bitter glucoside, *Picrorhizin*, yielding as its decomposition product *Picrorhizetin.* (2) Cathartic acid. (3) Gum, &c.

Action.—Stomachic and tonic. **B. P. Dose.**—10 to 20 grs. as a tonic; 40 to 50 grs. as an antiperiodic.

Official Preparations.

1. **Extractum Picrorhizæ Liquidum.**—1 in 1 of alcohol (60 p.c.) **B.P. Dose.**—20 to 60 ms.

2. **Tinctura Picrorhizæ.**—2½ ozs. to 1 pint. By maceration in alcohol (45 p. c.). **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

The root is bitter, acrid and stomachic. It is often used with success by the native *Kavirajes* in all forms of dyspepsia and neuroses of the stomach and bowels. It is a popular remedy with some physicians as an antiperiodic. It acts as a gentle cathartic either when given alone in large doses, or in small doses combined with other purgatives. As a remedy for bilious fever *kutki* is often combined with various aromatics and *neem bark.* In the form of a strong decoction, the bark may be prescribed with advantage for dropsies.

PICROTOXINUM. Picrotoxin.

N. O. *Menispermaceæ*

Habitat.—Southern and Eastern India and Burma.

Source.—A neutral principle obtained from the fruits of *Anamirta paniculata* (*Cocculus Indicus*). The fruits are known in Britain as Indian berries or fish-berries, and in India as *Kákmâri, Kákphala.*

Characters.—Colourless and inodorous crystals; taste bitter. ***Solubility.***—1 in 334 of water and 1 in 13½ of alcohol (90 p.c.). The commercial picrotoxin is not of constant composition. It is stated to contain *Picrotin* 34 p. c. and Picrotoxinin 66 p. c.

Action.—Parasiticide, anh ydrotic. **B.P. Dose.**—$\frac{1}{100}$ to $\frac{1}{16}$ gr. in pill, solution, or hypodermically. **Max. dose.**—$\frac{1}{10}$ gr. daily.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparations.

1. **Liq. Picrotoxini Aceticus.**—Picrotoxin 1, Glacial Acetic Acid 30. Dissolve and add Distilled Water to 250, filter. Keeps well and is palatable.

2. **Ungt. Cocculi, P. I.** *Syn.—Kákmári Ointment.*—Powdered seeds 80 grs., Prepared Lard 1 oz. mix.

3. **Lamellæ Picrotoxini.**—Each contains $\frac{1}{100}$ gr. for hypodermic injection.

Pharmacology.

Picrotoxin is a powerful poison.

Externally.—It kills low forms of vegetable and animal life, and is therefore **parasiticide.**

Internally.—It stimulates the **respiratory and vagal centres** in the medulla, and the **motor centres** in the cerebrum and cord, thus causing periodic stoppage of diaphragmatic movements, slowing of the pulse, and spasms of the flexors (epileptiform convulsions). Temperature rises somewhat.

Antagonists—Chloral hydrate. ($\frac{1}{20}$ gr. of picrotoxin is equal to 30 grs. of chloral).

Therapeutics.

The bitter fruits are used to poison crows and fish, and as a substitute for hops in beer.

Externally.—Picrotoxin ointment (8 grs. to 1 oz.) or *kákmári ointment* is chiefly used to destroy **pediculi** and sometimes **tinea capitis**, but it must be applied with caution, lest it be absorbed from the denuded surface and cause poisoning.

Internally.—Picrotoxin is very effective in **checking night sweats of phthisis**, but we cannot say how it acts. It has been used in **epilepsy, paralysis of the muscles of the pharynx** and **sick headache**, without much success. It is an antidote to morphine and chloroform asphyxia.

PILOCARPINE.

See Jaborandi, page 472.

PIMENTA. Pimento.

N. O. *Myrtaceæ.*

Habitat.—West Indies.

Source.—The dried full grown unripe fruit of *Pimenta officinalis*, the allspice tree.

Characters.—Dark reddish-brown, globular, two-celled fruits, $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in diameter. Pericarp rough, crowned by the remains of a four-toothed calyx, like a raised ring. Each cell contains a single brownish-black seed. Odour and taste like cloves.

Resembles.—Pepper, which has no calyx; cubebs which is stalked.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Composition.—(1) Volatile oil (off.), chemically identical with the oil of cloves.

Action.—Aromatic, stimulant and carminative. *Dose.*—10 to 30 grs.

OFFICIAL PREPARATIONS.

1. **Aqua Pimentæ.**—8 ozs. to 1 gallon. 1 in 20. Carminative. *Dose.*—1 to 2 ozs.

2. **Oleum Pimentæ.**—Distilled from Pimento. Yellow, but becomes brown by keeping. Sinks in water. **B.P. Dose.**—½ to 3 ms. on sugar, in pill and emulsion.

PHARMACOLOGY AND THERAPEUTICS.

The actions and uses of pimento and its oil are identical with those of cloves and of oil of cloves.

PINI OLEUM.

Oil of Pine. N.O. *Coniferæ.*

Syn.—Pinol, Pumiline.

Habitat.—Mountains of Central Europe.

Source.—The oil distilled from the fresh leaves of *Pinus pumilio.*

Characters.—Colourless or nearly so. Odour pleasant, aromatic. Taste pungent. Sp. gr. 0·865 to 0·870.

Composition.—Similar to that of the oil of turpentine.

Action.—Stimulant and disinfectant expectorant. *Dose.*—½ to ⅔ ms.

NON-OFFICIAL PREPARATIONS.

1. **Syrupus Pini Pumilionis.**—Pine oil 160 ms., Tinct. Saffron 5 drs., Alcohol (90 p c.) 2½ ozs., mist; then add boiling water 5 drs., Syrup. 5 ozs., Glycerin 5 ozs. and make up to 20 ozs. with syrup. *Dose.*—1 dr.

2 **Linctus Pini, Terpin et Heroin.**—Syrupus Pini, with the addition of Heroin Hydrochlor. 1/16 gr. and Terpine Hydrate gr. ¼ to each drachm. *Dose.*—1 dr.

3. **Hartman's Wood Wool.**—Finely comminuted pine wood, impregnated with sublimate. Used for dressings, vaccination pads, "towelettes" etc.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—The action of the oil of pine resembles that of oil of turpentine, except that its smell is more pleasant. When rubbed into the skin, it acts as a local stimulant and **rubefacient**, and is used in **chronic rheumatism, lumbago**, &c. Its vapor is a mild **stimulant, antispasmodic**, and **disinfectant** to the respiratory passages, and is serviceable in **bronchitis, phthisis** and **emphysema.** It may be inhaled from a handkerchief, or better through an inhaler. **Vapor Olei Pini** can be made by triturating oil 40 ms., with Mag. Carb. Levis. 20 grs.,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

and adding water to 1 oz. Of this 1 dr. is put into an inhaler containing ½ pint of cold and ½ pint of boiling water.

Internally.—Given internally, it is excreted by the bronchial mucous membrane, stimulating and disinfecting its secretion, and is therefore useful in **bronchitis** and chronic wasting lung diseases. It may be taken on **sugar** or in the form of a **jujube**.

PIPER NIGRUM. Black Pepper.

N. O. *Piperaceæ.*

Syn. I.V.—*Gól marich, kála marich*, Beng. *Gól marich*, Hind.

Habitat.—East Indies, such as Java, Sumatra, Malay Peninsula, and Malabar, Travancore where the plant is perennial.

Source.—The dried unripe fruit of *Piper nigrum.*

Characters.—Black, globular, inferior, one-celled fruits, ¼ in. in diameter. Pericarp deeply and reticulately wrinkled, containing one seed. Odour aromatic. Taste pungent. *Impurities.*—Berries of Embelia Ribes (*Biranga*).

Resembles.—*Pimento*, which bears a calyx, and *cubebs*, which has a stalk.

Composition.—(1) *Piperine*, resolvable into *Piperic acid* and *Piperidine*, a colourless liquid alkaloid. (2) *Oleo-resin*, yielding a *volatile oil* and *resin.*

Action.—Stimulant, carminative and antiperiodic. *Dose.*—5 to 15 grs.

Enters into.—Pulv. Opii Co. and the

Official Preparation.

1. **Confectio Piperis.**—1 in 10. A black paste, resembling, and is sometimes called, **Ward's Paste.** Useful in piles.

B.P. Dose.—60 to 120 grs.

Non-Official Preparations.

1. **Oleo resina Piperis. U.S.**—*Dose.*—¼ to 1 m. in pill.

2. **Piperinum.**—A colourless, crystalline, neutral principle, obtained from black and long pepper. Antipyretic and antiperiodic. Used in intermittent fever, hæmorrhoids and gonorrhœa. 18 grs. daily cured ague. *Dose.*—2 to 8 grs in pill.

3. **Piperonal.** *Syn.—Heliotropin.*—Obtained by the oxidation of piperine; in colourless crystals, with a vanilla odour. A powerful harmless antiseptic. *Dose.*—15 to 45 grs. in wafers.

4. **Piperidine Guaiacolate.**—In yellowish-white crystals, with a faint guaiacol odour. Recommended in phthisis. *Dose.*—5 to 30 grs.

5. **Piperidine Tartrate.**—White crystals soluble in water. A solvent of uric acid, in gouty deposits and uric acid gravel. *Dose.*—10 to 15 grs. *Max. Dose.*—24 grs. per day.

Pharmacology.

Externally.—On account of the volatile oil it contains, it is a **rubefacient, counter irritant,** and afterwards **anodyne.**

Internally.—It is a **stimulant stomachic and carmina-**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

tive like pimento. During elimination it stimulates the mucous membrane of the genito urinary tracts, and the secretion of the kidneys. In this respect it resembles cubebs. The unabsorbed portion of the drug, in passing over the rectum, restores the tone of the relaxed and chronically inflammed mucous membrane near the anus.

THERAPEUTICS.

Externally.—Like mustard, it may be used as a domestic counter-irritant.

Internally.—Both the black and the white pepper (decorticated black pepper) are used as culinary spices, not only in India, but in other countries. In the form of a gargle or lozenge it may be used in relaxed sore-throat. It is given in the shape of confection in hæmorrhoids, in ulcers of the rectum and anal fissure, and in gonorrhœa and gleet.

PIX BURGUNDICA. Burgundy Pitch.

N. O. *Coniferæ.*

Habitat.—Germany.

Source.—The resinous exudations obtained from the stem of *Picea excelsa*, melted and strained.

Characters.—Hard, brittle, yet gradually taking the form of the vessel in which it is kept, opaque, reddish-brown; fracture clean, conchoidal. Odour aromatic, especially when heated. Taste sweet, aromatic.

Composition.—*Resinous acids* and *volatile oil.*

OFFICIAL PREPARATION.

1. **Emplastrum Picis.**—1 in 2. A rubefacient and stimulant plaster.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—It is used as a basis for plasters. Being a mild stimulant to the skin, it is used in lumbago and chronic joint affections.

PIX CARBONIS PRÆPARATA.

Prepared Coal Tar.

Syn. I V.—*Alkátrá*, Beng:

Source.—Prepared by placing commercial coal tar in a shallow vessel and maintaining it at 120°F for one hour, stirring constantly.

Composition.—(1) *Benzene* and homologous hydrocarbons. (2) *Phenols.* (3) Naphthalene, anthracene, &c.

OFFICIAL PREPARATION.

1. **Liquor Picis Carbonis.**—1 in 6. Is the official imitation of **Liquor Carbonis Detergens**, which is an alcoholic solution of common coal tar.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparations.

1. **Creolin.** *Syn. Commercial.—Liquor Antisepticus.*—A specialty prepared from coal tar, of a dark colour. Recommended as an antiseptic: Valuable application in skin diseases as eczema, psoriasis, &c. Serves as a substitute for carbolic acid in Gynæcology. *Dose.*—1 to 5 grs. in phthisis, gonorrhœa, &c., and as an intestinal antiseptic in enteritis.

2. **Chinosol.**—The potassium salt of a compound of oxychinoline and sulphuric acid, in yellow minutely crystalline powder, readily soluble in water. Used as a surgical antiseptic; 15 grains to the pint equals 1 in 40 of carbolic acid. Should not be used for the sterilisation of instruments, as it is apt to stain them badly.

3 **Izal.**—A proprietary name. A white emulsion of oxidised hydrocarbons, obtained from coal oil, contains very little phenol or its homologues. A non-poisonous antiseptic and disinfectant. A ½ p. c. solution is very popular in obstetrical practice. Izal has also been used with benefit in the treatment of dysentery. *Dose.*—3 ms.

4. **Lysol.**—A German specialty. A dark coloured liquid, obtained by the saponification of cresols, and containing the higher homologues of phenol. Soluble in all proportions in water, and much less poisonous than phenol. A 2 p. c. solution is much used in surgery and gynæcological practice. It does not affect instruments, but, being a soapy fluid, it may make them difficult to hold.

5. **Cyllin.**—Contains 60 p.c. of a new analogue of phenol, neither caustic nor toxic. Forms a white emulsion with water. An ointment (5 p. c.) with lanoline useful in *eczema* and *scabies*. A good deodorising disinfectant, said to be from 10 to 30 times as strong as carbolic acid. Hartigan strongly recommends the use of Cyllin in **Psilosis**. The dose is 3 ms. put up in gelatin capsules, one to be given every 2nd hour until 8 have been taken. This number may rapidly be reduced to 2 or 3 a day.

6. **Keloolin.**—A similar preparation, containing 40 p. c. of phenol homologues.

Pharmacology and Therapeutics.

The actions and uses of prepared coal tar are identical with those of wood tar, (*q. v.*), except that the former is scarcely used internally. Liqr. Carb. Detergens is the best known remedy for **chronic eczema.** An ointment containing Liqr. Carb. Deter. ½ dr., Liq. Plumbi ½ dr., White Precipitate 15 grs., Vaseline 1 oz. is useful for the same purpose.

PIX LIQUIDA. Tar.

N.O. *Coniferæ.*

Syn.—Wood Tar. **Syn. Commercial.**—Stockholm Tar.

Source.—A bituminous liquid obtained from the wood of *Pinus sylvestris*, and other species of Pinus, by destructive distillation.

Characters.—A dark-brown or blackish, semi-liquid substance; Odour peculiar, aromatic. Sp. gr. 1·02 to 1·15. *Solubility.*—1 in 10 of alcohol (90 p.c.), slightly in ether, freely in olive and turpentine oils.

CC-0. Mumukshu Bhawan Varanasi Collection. Digitized by eGangotri

Composition.—(1) *Creosote.* (2) *Phenols.* (3) *Oil of turpentine.* (4) *Acetic acid.* (5) *Pyrocatechin.* (6) *Toluol.* (7) *Xylol.* (8) *Acetone.* (9) Resins, &c.

Action.—Antiseptic expectorant. *Dose.*—2 to 10 grs. or more in pills or capsules.

Official Preparation.

1. **Unguentum Picis Liquidæ.**—Black. Too hard to use. Ung. Picis Molle is a softer preparation.

Non-Official Preparations.

1. **Aqua Picis.** *Syn.—Tar Water, Eau de Goudron.*—Tar 1, fine Sawdust 3, mix and add Distilled Water 200. Macerate and filter.
Dose.— 5 to 10 ozs.

2. **Capsules of Tar.**—Contains 5 ms. in each.

3. **Pigmentum Picis Liquidæ.**—Tar 1, Alcohol (90 p.c.) 1. A stimulating application to psoriasis or chronic dry eczema.

4 **Pilula Picis liquidæ.**—Tar 1. Liquorice Powder 1. Mix. *Dose.*—2 or more pills thrice daily.

5. **Syr. Picis Liquidæ U. S., B. P. C.**—Useful in winter cough and chronic bronchitis. Taste is covered by syrup of wild cherry.
Dose.—1 to 2 drs.

6 **Ung. Picis Molle** (Squire).—Tar (by weight) 5, Yellow Beeswar 1, Almond Oil 1. Melt and mix.

Pharmacology.

Externally.—Wood tar resembles oil of turpentine in action, but is not so powerful As it contains creosote, phenol, oil of turpentine, &c., it is **antiseptic** and a **vascular stimulant.** When rubbed in, it sometimes causes severe inflammation, or pustules, of healthy sensitive skin, especially those parts which are hairy. It is a **sedative** to the nerves. Tar preparations, if used for any length of time, are apt to set up a very troublesome form of **acne**, called by Hebra, **tar acne.**

Internally.—It may cause indigestion, and in large doses symptoms of carbolic acid poisoning (see p. 182). It is absorbed and during elimination exerts a beneficial influence on the chronically inflamed bronchial mucous membrane, **disinfecting, deodorising and checking profuse secretion,** and promoting free **expectoration.** These effects may be obtained according to Yeo, both when used as an inhalation, or spray, and when taken internally.

Therapeutics.

Externally.—Tar water is a stimulating lotion for **wounds and sluggish ulcers.** The ointment or pigment is an excellent application for **chronic scaly skin diseases,** such as **psoriasis. Chronic eczema** too is benefited by it.

Internally.—As an expectorant, wood tar only is used for

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

chronic bronchitis, bronchiectasis and winter cough. It may be given in pills, capsules or syrup. Tar water may be given internally for the same object. Apomorphine combined with the syrup of tar and syrup of the virginian prune makes an admirable cough linctus.

ADDITIONAL COAL TAR DERIVATIVES AND ALLIED PREPARATIONS.

1. **Alypin.** *Syn.—Benzoyl-tetramethyl-diaminoethyl-dimethyl-carbinol-monochlorhydrate.*—A white crystalline powder, readily soluble in water, giving solutions of a neutral reaction, which yield no precipitate with sodium carbonate solution. A *local anæsthetic*, used hypodermically for minor operations and in ophthalmic practice. The anæsthesia lasts from 8 to 10 minutes. It is equal in intensity to Cocaine and much less toxic. Moreover it does not cause irritation of the conjunctiva. May be used in strengths of from 1 to 4 p.c.

2. **Anthrarobin.**—A brownish yellow powder, obtained by reduction from *alizarin*. The ointment (5 to 10 p.c.) used in *psoriasis*.

3. **Exodin.**—An *oxy-anthrachinon* derivative. A tasteless and inodorous yellow powder, insoluble in water. A safe and painless purgative, causing no gastric irritation. *Dose.*—7½ to 15 grs.

4. **Fluorescein.** *Syn.—Resorcin-phthalein Anhydride.*—A yellowish red crystalline powder, sparingly soluble in water and showing an intense green fluorescence, especially in the presence of an alkali. A 2 p.c. solution with 3 p.c. of Sodium Bicarbonate, used for *the detection of corneal ulcers* and *abrasions* which take a green colour that persists for several hours.

N. B.—In combination with sodium it forms a brownish-red powder, known as *uranin*, which gives a similar fluorescence.

5. **Fuchsine.** *Syn.—Rosaniline monohydrochloride.*—Brilliant iridescent crystals, forming a deep red solution with water. Used for *staining B. Tuberculosis* and in the treatment of *Renal albuminuria*.

Dose.—½ to 4 grs. in pill with glycerin of tragacanth.

6. **Isopral.** *Syn.—Trichlor-isopropyl alcohol.*—A white deliquescent volatile powder, with a pleasant camphoraceous odour and a sharp burning, slightly bitter taste. Fairly soluble in water and readily so in a mixture of alcohol and water. It is a *hypnotic*, resembling chloral hydrate in its action, but has no effect on the heart and circulatory system. Useful in *insomnia* and *maniacal excitement*. Said to be twice as active as chloral hydrate and less toxic.

Dose.—As a hypnotic, 10 to 15 grs.; for maniacal excitement, 20 to 45 grs. A mixture of 30 parts of Isopral with 10 parts each of absolute alcohol and castor oil produces hypnotic effects after inunction. The quantity necessary may be rubbed into the axilla or the upper part of the thigh.

7. **Kyrogenin.** *Syn.—Meta-benzamine-semicarbazide.*—A crystalline body, sparingly soluble in water, used in *pyrexia of phthisis*.

Dose.—3 to 24 grs.

8. **Methylene Blue.** *Syn.—Tetramethyl thionine chloride.*—Dull dark green crystals, forming an intense blue solution in water. A 3 p.c. solution is a useful local application for **eczema** in children. It is allowed to dry on and then covered with a thin layer of collodion. Used as an

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

analgesic in *rheumatism*, *migraine*, and *neuralgia*, and as an *antiperiodic* in *malarial fevers*. Colours the urine blue. *Dose.*—1 to 4 grs. Its chief use is *as a test for the permeability of the kidneys*. For this purpose 1 c.c. of a 5 p.c. solution is injected into the gluteus maximus and then hourly observations are taken to ascertain, (*a*) when the colour first appears in the urine, (*b*) how long the period of elimination lasts. With normal kidneys the colour first appears within 40 minutes and elimination is completed within 48 hours. If there be interstitial nephritis the first appearance of the colour is delayed and the period of elimination prolonged beyond 48 hours.

9. **Neuronal.** *Syn.—Brom-diethyl acetamide.*—A crystalline substance, soluble in alcohol, sparingly soluble in water. A safe and good *hypnotic*, resembling veronal in its action. Especially useful in *mental excitement of epileptics*. *Dose.*—7½ to 15 grs.

10. **Orexine Tannate.**—An insoluble greyish-white powder, without taste or smell. Antipyretic, antineuralgic, assists digestion and promotes appetite. Useful in *sea-sickness*. *Dose.*—4 to 8 grs

11. **Resorcin.** *Syn.—Meta-dihydroxybenzine.*—White crystalline plates, resembling benzoic acid, but larger. Easily volatilized. Soluble 1 in 1 of water, 2 in 1 of alcohol and 1 in 20 of olive oil. Powerfully *antiseptic*, coagulates albumen and has a caustic action in the skin. Solutions should not be stronger than 2 to 5 p.c. Very useful as a local application in *diphtheria*; also in the inflammatory stage of *eczema* (20 grs. resorcin to 1 oz. of zinc ointment). In the form of a spray it is used in *whooping cough*. Internally it acts as an intestinal antiseptic and has a specific action comparable to that of quinine, but although it is very slightly toxic it must be used with great caution as it is apt to produce profuse perspiration and its antipyretic action is of short duration. It must be administered well diluted with water and flavoured with syr. aurantii. It is incompatible with sp. æth. nitrosi. Used in *hectic fever* and in *infantile diarrhœa*, specially in combination with Benzo-naphthol. *Dose.*—3 to 8 grs.

12. **Resorcin-monacetate.** *Syn.—Euresol*—A honey-like mass, available for all purposes for which resorcin is used, especially for application to those parts of the skin covered with hair.

13. **Thio-Resorcin.**—A compound of resorcin and sulphur. A yellowish powder, recommended as a *substitute for iodoform*.

14. **Stovaine.** *Syn.—Amylene Hydrochloride.*—A *local anæsthetic*, less toxic than cocaine. It is said to be inferior to cocaine as an instillation; on the other hand, as a subconjunctival injection, it surpasses cocaine in its effects, and is specially useful in *operations for strabismus*. It does not alter the tension of the eye ball. A 4 p.c. solution in normal saline is the strength used for ophthalmic work.

15. **Thallinæ Sulphas.** *Syn.—Tetrahydroparamethyl Oxychinoline sulphate.*—White granular crystals, with a nauseous pungent taste, soluble 1 in 7 of water. Has marked antipyretic properties but is rarely used for that purpose because it is very liable to bring about destructive changes in the blood. Nine grains have been known to cause death. Is chiefly employed as a local application in *gonorrhœa* in the form of anthrophores, when it may be combined with Protargol, Resorcin or Tannin.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PLUMBUM. Lead. Pb.

Syn. I. V.—*Sisa*, Beng. ; *Sisak*, Sans.

The B. P. salts and preparations of lead are prepared either from (1) the Oxide or (2) the Carbonate.

PLUMBI ACETAS. Lead Acetate.

$Pb(C_2H_3O_2)_2, 3H_2O$.

Syn.—Sugar of Lead.

Source.—Obtained by dissolving lead oxide or lead carbonate in acetic acid. $PbO + 2HC_2H_3O_2 = Pb(C_2H_3O_2)_2 + H_2O$.

Characters.—Small, white, monoclinic prisms, slightly efflorescent ; odour acetous ; taste sweet, astringent. *Solubility*—1 in less than 3 of water, 1 in 30 of alcohol (90 p.c.). *Impurities*—Carbonates, chlorides, nitrates and other metals.

Incompatibles.—Mineral and tannic acids and their salts, alkalis, lime water, chlorides, iodides, preparations of opium, mucilage of acacia and albuminous fluids.

Action.—Sedative, astringent, hæmostatic. **B.P. Dose.**—1 to 3 grs. in mixture or pill.

Official Preparations.

1. **Pilula Plumbi cum Opio.**—3 of lead and ½ of opium in 4. Sedative, narcotic and powerful local and general astringent. **B.P. Dose.**—2 to 4 grs.

2. **Suppositoria Plumbi Composita.**—3 grs. of lead and 1 gr. of opium in each. Astringent, anodyne in dysentery, and hæmostatic, without deranging the stomach.

3. **Unguentum Plumbi Acetatis.**—1 in 25. White. Local astringent and sedative in irritable skin affections, &c.

LIQUOR PLUMBI SUBACETATIS FORTIS.

Strong Solution of Lead Subacetate.

Syn. B.P.—Goulard's Extract.

Source.—Prepared by boiling together lead acetate, lead oxide and water. $PbO + Pb(C_2H_3O_2)_2 = Pb_2O(C_2H_3O_2)_2$ lead subacetate.

Characters.—A clear colourless liquid, becoming turbid from exposure ; taste sweet, astringent ; reaction alkaline.

Action.—A powerful irritant and astringent ; only used diluted.

Official Preparations.

1. **Liquor Plumbi Subacetatis Dilutus.** *Syn. B.P.—Goulard's Lotion, Goulard Water.*—2 drs. to 1 pint. A colourless liquid. Local astringent and sedative.

2. **Glycerinum Plumbi Subacetatis.**—1 in 6 (weight). Astringent and local sedative.

3. **Unguentum Glycerini Plumbi Subacetatis.**—1 in 6. White. Mild local astringent and sedative.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

NON-OFFICIAL PREPARATION.

1. **Cremor Lithargyri.**—Solution of lead subacetate 1, Cream 7; mix. Useful in eczema.

PLUMBI CARBONAS. Lead Carbonate.

$2PbCO_3$, $Pb(HO)_2$.

Syn.—White Lead. **Syn. I.V.**—*Safedd*, Beng., Hind.

Source.—Prepared by the interaction of lead, water and carbonic anhydride in the presence of vapours of acetic acid.

Characters.—Soft, heavy, white powder. *Solubility.*—Insoluble in water, soluble in dilute acetic acid.

Action.—A mild astringent and sedative, used only externally.

OFFICIAL PREPARATION.

1. **Unguentum Plumbi Carbonatis.**—1 in 10. Cream-coloured. Used for excoriated inflamed surfaces and burns.

PLUMBI IODIDUM. Lead Iodide. PbI_2.

Source.—Obtained by the interaction of lead nitrate or acetate and potassium iodide.

Characters.—A heavy bright yellow powder. *Solubility.*—1 in 2000 of cold water, and 200 of boiling water.

Action.—Resolvent, antiparasitic.

OFFICIAL PREPARATIONS.

1. **Emplastrum Plumbi Iodidi.**—1 in 10. Bright yellow solid. Resolvent, alterative. In chronic enlargements of glands.
2. **Unguentum Plumbi Iodidi.**—1 in 10. Yellow. In ringworm and enlarged glands.

PLUMBI OXIDUM. Lead Oxide. PbO.

Syn. B.P.—Litharge. **Syn. I.V.**—*Mudrá sung*, Beng., Hind.

Source.—Prepared by the action of air on melted lead. $Pb_2 + O_2 = 2PbO$.

Characters.—Pale, yellowish-red, heavy scales. *Solubility.*—Completely in dilute nitric and acetic acids, insoluble in water.

Impurities.—Iron, copper, carbonates.

Enters into.—The preparation of Liq. Plumb. Fort., Plumbi Acetas, Glycerinum Plumb. Subacetatis and the

OFFICIAL PREPARATION.

1. **Emplastrum Plumbi.** *Syn.*—*Diachylon or Litharge Plaster.*—A pale yellow solid, being a crude oleate, palmitate and stearate of lead. Speaking *chemically* it is *soap*. A sedative and protective application.

Enters into.—Emp. Hydrarg., Emp. Plumbi Iodidi, Emp. Resinæ, Emp. Saponis.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Non-Official Preparation.

1. **Ung. Diachylon Hebræ** (modified by Kaposi).—Lead Plaster 1, Soft Paraffin 1 ; melt with heat. Useful in eczema, excessive perspiration of feet and sycosis.

Actions and uses of Lead Oxide.

The oxide has desiccant properties but is scarcely ever used. Emplastrum Plumbi the basis of most of the plasters. It serves mechanically to hold the lips of *wounds* together, to protect **irritable surfaces**, and by its pressure to help the absorption of **effused products** or **indolent enlargements.**

Pharmacology of Lead Salts.

Externally.—Lead salts have a feeble action on the unbroken skin, but on denuded and exposed mucous surfaces, wounds and ulcers, they produce the following definite effects.—They (1) **precipitate the albumen of discharges**, and form an impervious coating on the surface ; (2) **coagulate the albumen of the tissues** and condense them; (3) **constrict the blood-vessels** of the part, and arrest the escape of plasma and corpuscles ; and (4) **depress the local nerves**, and allay itching. Thus they are local **astringents, antiphlogistics,** and **nervine sedatives.**

Internally. **Gastro-intestinal tract.**—Insoluble lead salts are tasteless. Soluble salts have a sharp astringent and sweetish taste. The same local actions as on the skin, occur in the mouth, stomach and intestines. Soluble salts are converted into an albuminate, partly in the mouth, and partly in the stomach and intestine, and are absorbed as such. Whatever remains unabsorbed is eliminated as a sulphide with the fæces, to which it imparts a leaden hue. In the intestines, lead salts perform three distinct functions, *viz.*,—(1) they check the secretion of succus entericus, (2) constrict the arteries, and (3) arrest or retard peristalsis. They are therefore powerful **intestinal astringents** and **hæmostatics**, producing constipation and arresting any hæmorrhage that may exist. They diminish the secretion of bile.

Blood.—Lead salts are supposed to enter the blood as an albuminate, chiefly by the gastro-intestinal tract and skin, but occasionally by the respiratory tract. The plasma is said to become more watery, hæmoglobin is diminished, and the red blood corpuscles are reduced in number. Thus they induce a **sallow anæmia.**

Tissues.—Lead is freely taken up by, and remains in, the tissues of the body. The central nervous system, liver, kidneys and bones, are the principal seats of deposit. Thus being intimately connected with growing cells, it produces certain pathological effects, which are known as "*Plumbism.*"

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Elimination.—Lead is slowly excreted by the urine, bile, sweat, milk, and especially by the intestines. It checks excretion of urates and predisposes to gout.

Acute toxic action.—Concentrated solutions of lead salts are irritant. Acute poisoning is rare. Burning pain in the stomach, dryness of the throat, thirst, vomiting, colic, constipation with slate coloured stools, cold sweats, cramps in the legs, collapse; sometimes even stupor, coma, and convulsions, are some of the symptoms induced by the acetate.

Antidotes.—Stomach pump, zinc sulphate both as an emetic and antidote, followed by milk or the white of egg; dilute sulphuric acid. Sodium and magnesium sulphates are chemical antidotes, for they produce insoluble sulphates and open the bowels. Morphine or demulcent drinks to relieve colicky pain.

Chronic toxic action. "Plumbism."—Chronic poisoning by lead is very common and originates from the slow absorption and retention of minute quantities of the drug. Lead is therefore a **cumulative** poison. Workers in lead factories, and those who constantly handle lead are very prone to poisoning, for they generally contaminate their food by their unwashed hands. Some wines, cosmetics, hair-dyes, snuff packed in lead-foil, and drinking water stored in lead cisterns and pipes are also sources of danger.

The **symptoms** are characteristic. Besides impaired digestion, constipation, a sweetish taste in the mouth and intestinal colic, the formation of a **blue line** on the edge of the gums, most marked near the incisors, is an early symptom. It is due to the deposit of lead sulphide, the sulphur being obtained from the food and the tartar of the teeth. For the same reason a blue line may be noticed round the anus. **Severe cramps** in the calves of the legs next appear, followed by **paralysis of the extensors of the forearm**, leading to **wristdrop**. The latter symptom is due to chronic peripheral neuritis of the motor nerves supplying these muscles. The affected muscles become the seat of fatty degeneration, but it is to be noted that the supinator longus usually escapes. The paralysis may extend to other muscles, and there may be general paraplegia or hemiplegia. Occasionally the anterior cornua, of the spinal cord waste. The sensory fibres are not often affected, hence pain or numbness is rare.

Saturnine lunacy and **Saturnine epilepsy** may arise as the result of the action of the poison upon the nervous centres. Also **optic neuritis** and **blindness**. As lead prevents the **excretion of urates** from the blood, gouty inflammation of joints often ensues, and especially so in patients with a gouty diathesis. Chronic lead poisoning is also a very common cause of **granular kidney**, but we do not know whether this is due to the irritation caused by the lead salts, or to the gouty conditions produced by them. **Abortion** is a frequent complication, and for this reason diachylon plaster is often administered with criminal intent.

Treatment.—Avoidance of the poison. Alum and belladonna to relieve pain and constipation. Potassium iodide to dissolve insoluble compounds and magnesium sulphate to remove them from the system, and prevent their re-absorption after they have been eliminated into the intestines. Morphine subcutaneously for colic, sulphur baths to help elimination by the skin, electricity and friction to paralysed muscles.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Lemonade, made with acid. sulph. dil. instead of tartaric or citric acids, a milk diet, and strict personal cleanliness are the best methods of prophylaxis.

THERAPEUTICS OF LEAD SALTS.

Externally.—The uses of many of the preparations of lead have been briefly alluded to under their respective heads. Generally speaking, lead salts are useful in a variety of diseases :—(1) To *soothe irritation and control excessive discharge*, the lotions and ointments are employed in inflamed painful weeping **eczema**, irritable **ulcers** and **wounds**. The injection may be used with benefit in **vulvitis**, **leucorrhœa**, **gonorrhœa**, **gleet**, **otorrhœa**, &c. A lead and opium lotion. (Ext. opii 5 grs., Liq. Plumb. subacet. dil. 1 dr., and water to 1 oz.) is a good, sedative and antiphlogistic application to **bruises**, **sprains** and other **cutaneous inflammations**, such as **erysipelas**, &c. Diachylon ointment, alone or combined with zinc oleate or mercuric oleate ointments, makes a very effective non-irritant application. Lead collyria should never be used in **ulcerated cornea**, as a deposit of white lead may form, causing permanent opacity and blindnes. (2) To *allay irritation and itching*, a lotion or ointment is used in **pruritus pudendi** (the cause being first removed), **urticaria**, &c. (3) To *promote absorption* of morbid products, mechanically or otherwise, lead plasters are applied to **indolent glandular enlargements** and **swollen joints**. (4) To *arrest local hæmorrhages*, lead salts are never used. (5) As a *parasiticide*, iodide of lead ointment is used in **ringworm**.

Internally.—For its local astringent effects, Glycerinum Plumbi Subacetatis, or gargle can be used in **tonsillitis**, **pharyngitis**, &c. Lead acetate is the only salt that is used internally. Its chief use is to check severe **diarrhœa** and **hæmorrhage** from stomach and bowels as in **typhoid fever** and **tuberculosis**. Pilula Plumb. c. Opio is a very valuable preparation in such cases. Lead suppository or an enema of acetate of lead may be employed to arrest **rectal hæmorrhages**, and as an **astringent** in **chronic dysentery**. It is doubtful whether lead has any effect in **hæmoptysis**, though many physicians still prescribe it for this purpose, in combination with morphine.

PODOPHYLLI RHIZOMA.

Podophyllum Rhizome. N. O. *Berberidaceæ.*

Syn. B. P.—Podophyllum Root.

Habitat.—North America.

Source.—The dried rhizome and roots of *Podophyllum peltatum.* American May Apple, or Mandrake.

Characters.—Dark, reddish brown, smooth, or slightly wrinkled, cylindrical pieces; several inches long, ¼ to ½ in. thick; presenting at

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

intervals enlargements, which are marked on the upper surface by a depressed circular scar, and on the under surface stout, brittle rootlets, or their scars. Fracture short. Internally white, starch-like, or pale, yellowish-brown and horny. Odour characteristic. Taste bitter, acrid.

Composition.—*Resin* is the chief ingredient. It is composed of (1) *ether soluble* and (2) *alcohol soluble* resins, which contain an active purgative crystalline body. (3) *Podophyllotoxin*, which again splits up into (a) *Picro-podophyllic acid*, an inert body, and (b) *Picro-podophyllin*, a crystalline neutral substance, the active principle.

Action.—Cholagogue and hydragogue purgative. *Dose.*—10 to 20 grs.

Official Preparations.

1. **Podophylli Resina.** *Syn.*—*Podophyllin*, *Vegetable Calomel.*—A pale-yellow to orange-brown amorphous powder, prepared by extracting the root with alcohol (90 p.c.), and precipitating the resin with water; soluble in alcohol and ammonia. *Incompatibles.*—Water precipitates it from the alcoholic solution, and acids from the ammoniacal solution. **B. P. Dose.**—$\frac{1}{4}$ to 1 gr.

2. **Tinctura Podophylli.**—2 grs. of resin in 1 dr. **B.P. Dose.**—5 to 15 ms.

Non-Official Preparations.

1. **Podophyllotoxin.**—More certain in action and said not to cause constipation as an after effect. *Dose.*—$\frac{1}{10}$ to $\frac{1}{5}$ gr., for an adult; $\frac{1}{30}$ to $\frac{1}{20}$ gr. to children. 1 gr. dissolved in 2 drs. of alcohol (90 p. c.) best given in syrup or on sugar in 2 to 10 drop doses.

2. **Tinctura Podophylli Ammoniata.**—Podophyllum resin 1, Sp. Ammon. aromatic 50; dissolve and decant. Water does not precipitate the resin, which is a distinct advantage. A powerful hepatic stimulant, and purgative. *Dose.*—10 to 20 ms. as a purgative.

3. **Chologen Tablets.**—Said to contain mercury and podophyllin. In cholelithiasis.

Pharmacology.

Externally.—The resin acts as an irritant to the unbroken skin. The dust coming in contact with the eyes causes conjunctivitis. It is absorbed by raw surfaces and produces its specific effect, *i.e.*, purgation

Internally. **Gastro-intestinal tract.**—Being bitter and acid in taste, podophyllin may excite sallvation. In purgative doses, it causes griping, perhaps nausea, and within 10 to 12 hours a free watery stool. The purgative virtue is due to (1) the **increased secretion** from the intestinal glands, (2) the **increased peristalsis**, and (3) the **increased flow of bile.** Much of the force of the drug is directed to the small intestine, more specially the duodenum whose contents it sweeps along rapidly, in which respect it resembles calomel. Hence it has received the name of "vegetable calomel." Beyond this, it has none of the other properties of calomel. Impure resin produces

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

more griping, and common salt increases its cathartic effect. Therefore, it is a powerful hydragogue purgative. In large doses it gives rise to **gastro-intestinal irritation**, and sometimes causes death. Bile dissolves the drug. As a purgative its action varies with different individuals. Some are more susceptible than others.

Liver.—In *small doses* it is a powerful **hepatic stimulant**, increasing the amount and solids of the bile. In doses sufficient to act as a purgative, although the bile flows more freely from the gall-bladder to the duodenum, the drug is swept rapidly down the canal, without giving it time to be absorbed, consequently the biliary secretion is less stimulated than it would be by smaller doses. The old view was that it increases both *secretion* and *excretion* of bile and that it was therefore both a **direct** and **indirect cholagogue**, but this has lately been disputed.

Absorption.—It is absorbed by raw surfaces, mucous and serous membranes and cellular tissue. It produces its specific effects even when injected into the veins.

THERAPEUTICS.

Internally—As a **purgative** it is an excellent remedy for **constipation**, due to hepatic disorder or otherwise; the griping being corrected by Hyoscyamus, Belladonna, or Cannabis Indica. Its action becomes more uniform and certain, when combined with other purgatives, *e.g.*, aloes, jalap, colocynth, rhubarb. Calomel and podophyllin make a very advantageous combination, as they aid each other's actions on the same portion of the intestine. Being a **cholagogue** as well, it is best suited for **constipation** caused by the **torpid condition of the liver, biliousness** or **hepatic dyspepsia**. $\frac{1}{8}$ to $\frac{1}{4}$ gr. can be recommended as an ordinary dose for habitual constipation, but $\frac{1}{4}$ to $\frac{1}{2}$ gr. should be given in **obstinate constipation** or to relieve **portal congestion**. Sometimes larger doses are necessary. Ringer considers it an efficacious remedy for **infantile constipation**, with hard, lumpy, clay-coloured stools, 1 gr. resin may be dissolved in 1 dr. of alcohol (90 p. c.), and of this, 1 or 2 drops on a lump of sugar or with honey, 2 or 3 times a day. Whey, sharbet or mucilaginous drinks stop excessive purging.

As a pure **hepatic stimulant** it must be given in non-purgative doses ($\frac{1}{60}$ to $\frac{1}{20}$ gr), in many **functional disorders of the liver**, characterised by metallic taste in the mouth, dull depressed spirits, sluggish bowels, sick-headache, &c. According to Ringer, small doses are highly useful in some forms of **chronic diarrhœa**, marked by highly coloured motions and cutting pains, or by pale, watery frothy motions with severe griping; and in **diarrhœa** occurring in the morning and ceasing in the day, only to return next morning. In such cases one or two drops of the alcoholic solution may be given 3 or 4 times a day.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Prescribing hints.—One of the best ways of giving podophyllum is to dissolve it in Sp. Ammon. Aromat. (1 gr. to 1 dr.), as the resin then remains in solution on the addition of water and is not precipitated as it is if you use the B.P. tincture.

Pill for habitual constipation and torpid liver.—Podophyll. Res. ½ gr., pulv. Ipecac. ⅛ gr., Ext. Euonym. sic. 1 gr., Ext. Nucis Vom. ⅛ gr., Ext. Hyoscyamus ½ gr., Pil. Rhei Co. 2 grs. m. ft. Pil. mitte Tales xii. Twice daily after breakfast and dinner.

PODOPHYLLI INDICI RHIZOMA.

Indian Podophyllum.

(*Ind. and Col. Addendum.*)

Habitat.—Indian and Eastern Colonies.

Source.—The dried rhizome and roots of *Podophyllum Emodi.*

Characters.—Horizontal, more or less cylindrical and contorted, ¼ to ⅜ in. thick, crowded above with tuberosities, marked by depressed scars; giving off numerous simple rootlets from the under surface. Earthly brown. Faint odour, bitter taste.

Composition.—Indian Podophyllum contains double the amount of resin yielded by *Podophyllum Peltatum* but the resin contains only half the quantity of crystalline *picropodophyllum* to which the value as a cathartic is due.

Official Preparations.

1. **Podophylli Indici Resina.**—A powdered resin obtained from *Podophyllum rhizome* and resembling Pod. resin. **B. P. Dose.**—¼ to 1 gr.

2. **Tinct. Podophylli Indici.**—Ind. Podophyllum resin 1, Alcohol 3 (90 p.c.). **B.P. Dose.**—5 to 15 ms.

Pharmacology and Therapeutics.

Precisely as the other variety (see p. 567). The resin however is not quite so powerful as a purgative and it does not answer to the B. P. tests. It *gelatinises* with a solution of ammonia, and cannot therefore be administered dissolved in Sp. Ammon. Aromatic.

POTASSIUM. Potassium. K.

POTASSA CAUSTICA. Potassium Hydroxide. KOH.

Syn. B.P.—Caustic Potash, Potassium Hydrate, Hydrate of Potassium B.P. 1885.

Source.—Prepared by the interaction of potassium carbonate and calcium hydroxide. $K_2CO_3 + (OH)_2 = 2KHO + CaCO_3$.

CC-0. Hardwicke Med. Collection. Digitized by eGangotri

Characters.—Deliquescent corrosive, alkaline, white pencils or cakes. *Solubility.*—2 in 1 of water and 1 in 2 of alcohol (90 p.c.).

Impurities.—Lead, copper, arsenium chloride. Should not contain more than 10 p.c. of combined water and impurities.

Action.—Powerful caustic.

Enters into.—The preparation of Pot. Bromid., Pot. Iodid., Pot. Permanganas, and the

OFFICIAL PREPARATIONS.

1. **Liquor Potassæ.**—27 grs. Caustic Potash in 1 oz. A colourless, odourless, transparent, alkaline, liquid, with sp. gr. 1.058

Impurities.—Carbonates, sulphates, chlorides and other metals.

Dispensing hint.—To be kept in green glass bottles with air-tight stoppers.

Action.—Antacid. **B.P. Dose.**—10 to 30 ms., well diluted.

NON-OFFICIAL PREPARATION.

1. **Potassa cum Calce.** *Syn.*—*Vienna Paste.*—Caustic Potash and quick lime in equal weights. Also sold in moulds and cylinders.

PHARMACOLOGY.

Externally.—Caustic potash or a concentrated solution of potash has a strong affinity for water, and dissolves albumen. It therefore rapidly destroys tissues with which it comes in contact, producing a greyish eschar. Hence, it is a powerful **irritant** and **caustic.** A less concentrated solution is irritant, softening and dissolving the epidermis. Still more diluted, it (1) reddens the skin, (2) neutralises acids, aud (3) dissolves greasy substances. It is therefore a **rubefacient, antacid** and **detergent.** A *hot weak* solution is a **sedative.**

Internally.—Liquor potassæ acts in the same way as the potassium carbonates, but it has more irritant and less diuretic action.

THERAPEUTICS.

Externally.—Caustic potash is now rarely used to make openings into deep seated **abscesses** or **cysts,** such as liver abscesses, but occasionally the solid stick is applied to destroy **lupus** and **epithelial cancers.** As it diffuses rapidly, care should be taken to protect the surrounding and deeper tissues, by applying blotting paper to absorb the moisture, or covering the part with two or three pieces of plaster, and applying the caustic through a hole in the centre. The hole should be *smaller* than the eschar which it is intended to produce. Acetic acid or vinegar diluted, should be applied to neutralise the caustic when further action is no longer required. The severity of its action can be better controlled by the use of *Vienna paste,* which is more manageable than the undiluted caustic potash. Poisonous wounds, foul, unhealthy or corroding ulcers can be similarly treated and so made to take on healthy action.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

A pellet of cotton wool soaked in liquor potassæ firmly applied over an ingrowing toe nail, so far softens it as to admit of its being easily scraped or peeled off without pain. Weaker lotions are used to partially dissolve and facilitate the removal of scales in **psoriasis**, and to allay the **itching of urticaria** and **eczema**. A weak hot lotion may be employed locally as a fomentation or bath to relieve the pains of **gout** and **rheumatism**. Soft or potash soaps are good cleansing agents.

Internally.—As an antacid, it is occasionally serviceable in **irritative acid dyspepsia**. but as an alkaliniser of blood and urine, the bicarbonate, citrate and acetate are to be preferred, as they are less irritant to the stomach. It is given to **absorb fat** in **obesity**, but serious consequences may follow from excessive use of alkalies or their carbonates, as they cause derangement of digestion and lessen the total amount of the solids of the blood. They also undoubtedly increase the oxidation of both fats and proteids. You should therefore always advise your patients to avoid the various quack nostrums which are extensively advertised as cures for corpulence.

POTASSA SULPHURATA.

See Sulphur.

POTASSII ACETAS. Potassium Acetate.

$CH_3,COOK$.

Source.—Prepared by fusing the product of the interaction of acetic acid and potassium carbonate. $K_2CO_3 + 2(CH_3COOH) = 2CH_3.COOK + H_2O + CO_2$.

Characters.—White foliacious, satiny masses, or granular particles, deliquescent, alkaline. *Solubility*.—2 in 1 of water, 1 in 2 of alcohol (90 p. c). *Impurities*.—Carbonates, sulphides and metallic impurities.

Action.—Diuretic and lithontriptic. **B.P. Dose**.—10 to 60 grs.

POTASSII CITRAS. Potassium Citrate.

$C_3H_4.OH.(COOK)_3$.

Source.—Prepared by the interaction of citric acid and potassium carbonate. $3K_2CO_3 + 2H_3C_6H_5O_7 = 2K_3C_6H_5O_7 + 3H_2O + 3CO_2$.

Characters.—White, deliquescent powder. Taste saline, feebly acid. *Solubility*.—Freely in water.

Action.—Antacid, diaphoretic and diuretic. **B.P. Dose**.—10 to 40 grs.

POTASSII TARTRAS. Potassium Tartrate.

$(CHOH)_2(COOK)_2, H_2O$.

Source.—Prepared by neutralising acid potassium tartrate with potassium carbonate. $2KHC_4H_4O_6 + K_2CO_3 = 2K_2C_4H_4O_6 + H_2O + CO_2$.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Small, colourless, 4 or 6 sided prisms. Neutral in reaction. *Solubility.*—1 in 1 of water. *Impurities.*—Acid tartrate, metals.
Action.—Diuretic, cathartic. **B. P. Dose.**—20 to 60 grs., as a diuretic; 2 to 4 drs. as a purgative.

POTASSII TARTRAS ACIDUS.

Acid Potassium Tartrate.

$(CHOH)_2$ COOH.COOK.

Syn. B.P.—Bitartrate of Potassium, Purified Cream of Tartar.
Source.—Prepared from the crude cream of tartar which is deposited during the fermentation of grape juice and from the lees of wine.
Characters.—A gritty white powder, or fragments of crystallised cakes. Taste acid. *Solubility.*—1 in 200 of cold water, not in alcohol. *Impurities.*—Sulphates, chlorides and metals.
Action.—Diuretic, saline purgative. **B.P. Dose.**—20 to 60 grs., as a diuretic; ½ to ½ oz. as a purgative.
Enters into.—The preparation of Acid Tartartic, Ferrum Tart., Antim. Tart., Sod. Tart., Pot. Tart., Conf. Sulph., Troch. Sulph., Pulv. Jalap. Co.

Non-Official Preparation.

1. **Imperial Drink.** *Syn.*—*Potus Imperialis.*—Acid Pot. Tartrate 1 dr., Glusidum 1 gr., Ol. Limonis 3 ms., Boiling Water to 1 pint: or Acid Tartrate 1 to 1½ drs., Sugar *q.s.*, boiling water to 1 pint, in which half the peel of a fresh lemon has been infused.

Pharmacology of Potassium Acetate, Citrate, Tartrate and Acid Tartrate.

Externally.—All these salts are neutral, except the acid tartrate which is acid. They have none of the antacid or caustic properties of liquor potassæ or alkaline potassium salts.
Internally. **Gastro-intestinal tract.**—These salts are not irritant to the stomach and are therefore easily bourne. Being neutral (one faintly acid), they are **not antacid** like the alkaline potash salts. In large doses (½ to ½ oz.) they are purgatives. The tartrate and acid tartrate are typical saline hydragogue purgatives. They produce easy liquid motions without griping. They act by stimulating the secretion of succus entericus and hindering its reabsorption (See page 128.). A portion may possibly be converted into carbonate in the intestine and absorbed as such, but the greater portion is excreted with the fæces. A little of that which is absorbed may be re-excreted into the bowels, thus acting as a **remote purgative.**
Blood.—All potash salts made from vegetabte acids are converted into carbonates after absorption into the blood, thereby increasing its alkalinity. They are therefore **indirect**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

alkalinisers of blood. The alkalinity is not affected if the salt is acid, such as acid tartrate. Reaching various tissues of the body containing potassium salts, they supply their wants, and thus act in a manner as **restoratives.**

Kidneys.—All these salts in moderate doses are **diuretics,** especially the acetate; the tartrate and acid tartrate acting only in a modified degree. They are direct stimulants to the renal cells. They are speedily eliminated as carbonates and in their passage through the kidney, render the urine alkaline. They are therefore powerful and rapid **alkalinisers of acid urine.** Although the urine becomes alkaline, yet the total amount of acids eliminated is increased. They have a very slight effect on the flow in health.

Skin.—All of them are mild diaphoretics, and are said to act by dilating the cutaneous capillaries, but the method of their action is obscure. Of all these salts, the citrate is considered to be the most reliable diaphoretic.

Note.—These salts act either as diuretics or diaphoretics indiscriminately. If you wish the former effect, you must keep the patient cool; if the latter, wrap him up in blankets and administer warm drinks as adjuvants.

THERAPEUTICS OF POTASSIUM ACETATE, CITRATE, TARTRATE AND ACID TARTRATE.

Internally. **Gastro-intestinal tract.**—The nascent citrate and tartrate are powerful gastric sedatives, and are therefore prescribed for **gastric irritability.** For this purpose, the carbonate or bicarbonate is given with lemon juice, citric acid and tartaric acid in an effervescing form (see page 185). The tartrate and acid tartrate are used only as saline hydragogue purgatives in **constipation, piles, dysentery,** or for the abstraction of fluid in **dropsy, uræmia, ascites, pleuritic effusion,** &c. For this object they should be given in a concentrated form. Their twofold action on the bowels and kidneys renders them peculiarly serviceable in this class of cases. Pulv. Jalap. Co., or the acid tartrate in lemonade can thus be given as a hydragogue.

Blood.—These salts were formerly largely given in **acute rheumatism,** because they rendered the blood alkaline, but since the salicylates have come into use they are rarely prescribed for this purpose. In **gout,** both the direct and indirect alkaline potash salts are used, with the object of not only holding in solution the excess of uric acid circulating in the blood, but of affecting the "chemistry of the tissues, causing an increased oxidation, and thereby preventing to some extent the formation of uric acid." The citrate of potash has been recommended in **scurvy,** but it cannot replace fresh lemon juice or fresh vegetables.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Kidneys.—These salts are eminently successful in **alkalinising acid urine.** When we want to maintain its alkalinity for a long period, the citrate is to be selected, as it does not derange the stomach. Thus they not only prevent the precipitation of uric acid, in cases of **uric acid diathesis,** but actually dissolve small **uric acid calculi** in the kidneys or bladder. Sir W. Roberts warns us against using more than 40 to 60 grs. of acetate or citrate in 4 ozs. of water, every 4 hours, for he says that in larger doses they may cause a formation of insoluble biurate on the surface of the stones. To **increase diuresis** the citrate and acetate are chiefly employed. The saline diuretics are largely given in **febrile conditions, Bright's disease, and renal dropsy** and occasionally in **cardiac dropsy,** on account of their depressing influence on the circulation. For this purpose they are combined with digitalis or scoparium.

Skin.—Occasionally the citrate and acetate are given in fevers to produce diaphoresis. The imperial drink is a pleasant refreshing beverage which is much appreciated by fever patients.

Lungs.—Because these salts are converted into carbonates in the blood, the citrate and acetate are sometimes given as expectorants in **bronchitis with viscid secretion.**

POTASSII BICARBONAS. Potassium Bicarbonate.

$KHCO_3$.

Syn. B.P.—Potassium Hydrogen Carbonate.

Source.—Obtained by saturating a strong aqueous solution of potassium carbonate with carbonic anhydride, $K_2CO_3 + CO_2 + H_2O = 2KHCO_3$

Characters—Colourless, non-deliquescent, non-corrosive, monoclinic prisms. Taste feebly alkaline. *Solubility.*—1 in 4 of water. *Impurities.*—The same as of carbonate.

Action—Antacid, sedative, lithontriptic, diuretic.

B.P. Dose.—5 to 30 grs. in solution.

N. B. 20 parts by weight are neutralised by 14 parts of citric and 15 of tartaric acid, whilst the carbonate requires 17 and 18 respectively.

POTASSII CARBONAS. Potassium Carbonate.

K_2CO_3, H_2O or K_2CO_3, $2H_2O$.

Syn. B.P.—Salt of Tartar.

Source.—Obtained from the ashes of wood, or by interaction of crude potassium sulphate and crude calcium carbonate and carbon.

Characters.—White, deliquescent, crystalline powder. Taste alkaline, caustic. *Solubility.*—1 in 1 of water. *Impurities.*—Sulphates, chlorides, metals.

Action.—The same as of bicarbonate. **B.P. Dose.**—5 to 20 grs.

Enters into.—The preparation of Decoct. Aloes Co., Liq. Arsen.,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pot. Caustic., Mist. Ferri Co., Pot. Sulphurat., Pot. Acetas, Pot. Bicarb., Pot. Citras, and Pot. Tartras.

PHARMACOLOGY OF POTASSIUM CARBONATE AND POTASSIUM BICARBONATE.

Externally.—A solution of these salts has actions somewhat resembling those of liquor potassæ. The carbonate is more irritant and corrosive than the bicarbonate, but less so than caustic potash or liquor potassæ. The carbonate is seldom used.

Internally. **Gastro-intestinal tract.**—The bicarbonate possesses all the properties of potassium salts, without any local irritative effects, and is therefore, usually prescribed. Like other alkalies, it momentarily **checks the secretion of alkaline saliva** in the mouth. Reaching the stomach, like the other alkalies, it performs three specific functions, *viz.*—(1) Given before a meal, it **stimulates** the secretion of the **gastric juice**, which continues to flow even after the alkali has been neutralised. (2) Taken after a meal, it neutralises the excessive **acidity** of the contents of the stomach as well as the gastric juice already secreted; hence it is an **antacid**. (3) It is a **sedative** to the gastric nerves. Very large single doses cause vomiting. Repeated large doses open the bowels by paralysing their muscular coats.

Blood.—Both these salts are freely absorbed and rapidly excreted, the bicarbonate being converted into carbonate. They temporarily increase the alkalinity of the blood. In anæmic conditions, they raise the hæmoglobin value and the corpuscular richness, especially if combined with iron. If given for any length of time, they cause the quality of the blood to deteriorate and reduce the body weight.

Heart and circulation.—Small doses of potash salts have no influence on the heart. Large doses decidedly **depress the cardiac force**, and toxic doses arrest it in diastole, by directly affecting the cardiac muscles. This effect is most marked if the salt is directly introduced into the veins, when, after a transitory excitement, clonic spasms, paralysis and death occur. With large doses, the blood-pressure and pulse-rate fall considerably.

Respiratory tract.—Potash salts stimulate the bronchial secretion, and make the mucus less viscid. They are therefore **expectorants**. Potassium iodide possesses this property in a very marked degree.

Kidneys, &c.—Both the bicarbonate and carbonate, as well as the vegetable potash salts, are eliminated as carbonates, and in this way, they stimulate the secretion of urine, and are therefore **diuretics**. They also **alkalinise** the urine and thereby increase its capacity of holding more **uric acid in solution**. Passing over the mucous membrane of the genito-urinary tract, they either exercise a direct sedative action on it; or by rendering the urine alkaline soothe any irritation that may be present.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Nervous system and muscles.—They are direct depressants to the brain, spinal cord and muscles, hence they must be used with caution. These salts when locally applied in minute doses cause the muscles to contract, but if the application is continued for any length of time, or in larger doses, they paralyse them. They abolish the prolonged contraction produced by veratrine or barium salts.

Toxic action.—Poisoning by caustic potash is rare. The symptoms are similar to those produced by caustic soda (*q.v.*).

Therapeutics of Potassium Bicarbonate and Carbonate.

Externally.—These salts can be given in the same class of cases where liquor potassæ is used. A solution of potassium carbonate (1 dr. to 1 pint) allays the troublesome **itching** of many skin diseases, such as **urticaria, lichen,** &c. and as an injection, arrests the discharge in **leucorrhœa.** A weaker solution (½ dr. or less, in 1 pint) checks the weeping of raw, red **eczema.** For this purpose a piece of lint soaked in the lotion is applied to the raw surface and then covered with oiled silk to check evaporation.

Internally.—The bicarbonates are always used in preference to the carbonates and sodium salts in preference to those of potassium. In **dyspepsia,** where the gastric secretion is deficient, the bicarbonate can be given a few minutes before food; and where there is epigastric pain, heart-burn or acid eructations, it is best administered after food. In **gastric irrtability,** or to render the **blood and urine alkaline,** it is best given in effervescing form (30 grs. in 1 pint). Thus, it is beneficial in **gout,** as it holds more uric acid in solution. Formerly it was largely prescribed for **rheumatism.** The writer has at times found good results in **chronic rheumatism** and **rheumatoid arthritis,** by combining it with potassium iodide. As an **antidote** to poisoning by caustic acids, the carbonate or bicarbonate is to be avoided for it creates carbonic acid gas and so causes risk of rupture of the stomach. Liquor potassæ and other alkaline salts can be used instead. The bicarbonate is used in **bronchitis** to lessen the viscidity of the expectoration, but large doses cause anæmia of the mucous membrane, and diminish the secretion to a dangerous extent.

Caution.—For the reasons already mentioned potassium salts should not be continued too long.

POTASSII BICHROMAS. Potassium Bichromate.

K_2CrO_4, CrO_3

Syn. B.P.—Potassium Dichromate, Red Chromate of Potassium.

Source.—Obtained by roasting chrome ironstone with lime in the presence of air, and by treating the resulting chromate with a potassium salt, and subsequently with an acid.

Characters.—Large, orange-red, transparent, triclinic crystals; fuse below redness. **Solubility.**—1 in 10 of water.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Enters into.—The preparation of Chromic Acid.
B. P. Dose.—$\frac{1}{10}$ to $\frac{1}{5}$ gr. in capsule or pill with Kaolin.

Actions and Uses.

Potassium bichromate is rarely used in medicine, but extensively in arts. In large doses, it causes severe **gastro-enteritis** with collapse. Those who handle this salt, suffer from **eczema.** Dr. Fraser recommends it in **dyspepsia** and **gastric ulcer.** It is best given in pill form on an empty stomach.

Toxic action.—It is a powerful irritant poison.

Antidotes.—Emetics or pump. Albuminous and demulcent drinks, magnesium carbonate, chalk, &c.

POTASSII BROMIDUM.

See page 281.

POTASSII CHLORAS. Potassium Chlorate.

$KClO_3$.

Source.—Obtained by passing chlorine into water holding lime or magnesia in suspension, treating the clarified liquid with potassium chloride and subsequently crystallising.

Characters.—Colourless, monoclinic crystals. Taste cool, saline.
Solubility.—1 in 16 of cold, 1 in 3 of boiling water.

Incompatibles.—Explodes when rubbed with sulphur, sulphides, charcoal, sugar, tannic acid, ammonium chloride or glycerin. Mineral acids, ferrous salts.

Action.—Local stimulant and antiseptic.

B. P. Dose.—5 to 15 grs. in solution or tablets.

Enters into.—The preparation of Pot. Permanganas and the

Official Preparation.

1. **Trochiscus Potassii Chloratis.**—3 grs. in each, white.
Dose.—1 to 6.

Non-Official Preparations.

1. **Gargarisma Chlori.**—Pulv. Pot. Chlorat. 1 dr., Acid Hydrochlor. 16 ms., Distilled Water 8 ozs. Generate chlorine gas by mixing chlorate and acid, and dissolve it gradually in water. ½ oz. glycerin may be added.

2. **Voice Tablets.**—**Tablets of Potassium Chlorate,** 5 grs. each. **Tablets of Potassium Chlorate and Borax,** 5 grs. each. Tablets of **Potassium chlorate, Borax and Cocaine Hyd.** 5 grs. each.

Pharmacology.

The actions of potassium chlorate are not identical with those of the other potassium salts.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Externally.—Coming in contact with a septic surface, or discharge, it is decomposed, and oxygen is liberated. This nascent oxygen then acts as a **stimulant** and **antiseptic to living tissues**, but it is not an antiseptic in the ordinary sense of the term, as outside the body it has very little effect, even upon the most sensitive bacteria.

Internally. **Gastro-intestinal tract and liver.**—In small doses, potassium chlorate has no action, but in large doses, it causes *gastro-intestinal irritation* with vomiting and purging.

Heart and circulation.—Small doses have no action on the heart, but large doses **depress** it, sometimes even causing death A small portion is converted into a chloride in the blood, and the rest is excreted unchanged with the urine and other secretions. According to Binz the salt is reduced in the blood stream and thus free oxygen is given off to the tissues, but Coghill considers that its mere presence in the blood is enough to oxygenate it. Whatever may be the exact truth, it is a fact that it has some alterative and stimulating inflence on the unhealthy mucous surfaces and on the functions of the secreting structures. In very large doses, it disintegrates the red blood corpuscles, and **converts hæmoglobin into methæmoglobin**, thus turning the red blood brown, and making the skin cyanotic. If the blood of a patient poisoned by potassium chlorate be shaken up with air or exygen it does not regain its arterial colour (distinction from ordinary cyanosis). These changes in the blood are accelerated by—

(1). Addition of large quantity of sodium carbonate.
(2). Warmth.
(3). Carbonic acid and the acid phosphates.
(4). Diminished alkalinity of the blood.

These facts should be carefully remembered as they have an important bearing on the question of the treatment of disease by means of the large doses of the drug.

Kidneys.—In moderate doses (15 to 20 grs.) it acts as a diuretic, and more powerfully during pregnancy. In toxic doses, the kidneys become congested, the urine becomes bloody or dark-coloured, and at last there is complete suppression. Death occurs usually from uræmia.

Secretions.—It influences peculiarly the salivary, buccal and mammary secretions, which increase if deficient and decrease if excessive. The bronchial secretion is also increased.

Toxic action.—It is no longer reckoned as an inert substance, for poisoning has occured in doses not considered toxic, though given freely. Cyanotic appearance, vomiting, purging, hæmaturia, suppression of urine, dyspnœa and cardiac weakness, are some of the chief symptoms. 7 drs. have caused death.

As it formerly happened that, in many cases of poisoning from potassium chlorate, the symptoms were erroneously attributed to diphtheria,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

so on the other hand, in fatal cases of diphtheria which have been treated by the chlorate, the symptoms may very easily be mistaken for those of poisoning from the chlorate. When such cases form the subject of legal enquiry, great care and caution are necessary in forming an opinion upon them.

THERAPEUTICS.

Externally.—Potassium chlorate is never used for washing **ulcers, wounds, sinuses or suppurative cavities**, though a lotion (5—6 grs. to 1 oz) can be usefully employed for this purpose.

Internally.—Its chief local use is in the treatment of many mouth and throat diseases, such as **aphthous, ulcerative and gangrenous stomatitis, follicular tonsillitis**, and **follicular pharyngitis**. A lotion (10—15 grs. to 1 oz. of water, or any astringent infusion) is an excellent gargle for such cases. Tablets or lozenges may be slowly sucked. The powdered salt locally applied to **spongy gums**, and **aphthous spots** on the gums cheek and tongue, conduces to their rapid healing, and in case of small **epithelial cancers**, to diminution of pain and arrest of growth.

These catarrhal conditions of the mucous membrane of the mouth and fauces are greatly benefited if the local treatment is accompanied by internal administration, for the salt is excreted with the saliva after absorption, and thus locally influences the disease. Its efficacy is greatly increased if it is combined with borax, or in case of **hoarseness of voice**, with borax and cocaine. Certain blood diseases, such as **hæmorrhagic purpura, epistaxis, hæmaturia**, are said to improve under potassium chlorate (Hankin). It is now rarely used in **diphtheria**, though still occasionally employed in **croup** and acute and chronic **bronchitis**. As a supposed oxygenating agent, some yet prescribe it for **low fever** and **blood poisoning**. The writer considers this drug to be a valuable diuretic in the **suppression of urine in cholera**.

Prescribing hints.—In order to avoid misadventure, the following points must be carefully borne in mind.—(1) Pot. chloras must be *given cautiously* when the *temperature is high*, or when the *breathing or circulation is embarrassed*, for in fever the alkalinity of the blood is lessened, and if there is dyspnœa, the tension of the carbonic acid in the blood is raised. (2) *Never give a large dose on an empty stomach*, as it will then be absorbed too rapidly. (3) *Withhold it altogether in disease of the kidney*, as, owing to the diminished excretion of urine, it may readily accumulate to an undesirable extent. (4) *When the patient is unable to take food*, the use of the remedy should be limited to painting the fauces with a solution which should not be stronger than 5 p. c. (5) When giving the remedy in larger doses avoid the *simultaneous use both of free acids and mineral waters rich in*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

carbonic acid. (6) The *total amount given in 24 hours* should not exceed :— (*a*). For an infant.....20 grs.
(*b*). For a child.....30 grs.
(*c*). For an adult.....90 grs.

POTASSII IODIDUM.

See page 464.

POTASSII NITRAS. Potassium Nitrate.

KNO_3.

Syn. B.P.—Nitre, saltpetre. **Syn. I.V.**—*Sorá*, Beng. *Shorá*, Hind.

Source.—May be obtained by purifying crude nitre, or by the interaction of sodium nitrate and potassium chloride. The crude nitre is chiefly found in the surface soil of India.

Characters.—White crystalline or striated, 6-sided, colourless prisms. Taste cool, saline. *Solubility.*—1 in 4 of cold, 2 in 1 of boiling water. *Impurities.*—Chlorides, sulphates, lime.

Action.—Diuretic, diaphoretic.

B.P. Dose.—5 to 20 grs. in solution.

Enters into.—The preparation of Argenti Nitras Induratus and Argenti Nitras Mitigatus.

Non-Official Preparations.

1. **Nitrated Papers.** *Syn.—Ozone Papers.*—Are made of 3 strengths by saturating white blotting paper in a solution in nitre of the strength of 30, 45 or 60 grs. to the ounce. The fumes are inhaled in asthma.

2. **Charta Nitrata et Chlorata.**—Soak blotting paper in a concentrated solution of nitre and potassium chlorate and dry. In asthma. (Suggested by Ringer. The whole room should be filled with the fumes.)

3. **Pulv. Lobeliæ Comp.**—Potassium Nitrate 240, Boiling Distilled Water 240, dissolve and soak a mixture of Lobelia, Stramonium leaves and Black Tea in powder of each 240. Mix well, dry, and add oil of anise 1. One tea-spoonful may be burnt to fumigate a bed-room, or the fumes inhaled in asthma. This is a supposed imitation of **Himrod's, Bliss's** and the **Green Mountain Cures.**

Pharmacology.

Externally.—Potassium nitrate is slowly absorbed by the unbroken skin, and produces a local **refrigerant** action, by reducing the circulation of the part.

Internally. **Gastro-intestinal tract.**—Being very diffusible, it is very readily absorbed, and quickly eliminated **unchanged.** Large doses cause **gastro-enteritis** and even death from excessive vomiting and purging. Buchheim considers that these effects are entirely due to diffusion.

Heart and blood.—Of all the potash salts, it is the most **powerful depressant** to the heart, rendering its action slower and weaker. It destroys the normal oxygenating powers of the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

red-blood corpuscles, and in large doses lowers the **coagulability** of the blood. The depression of the heart is due to (1) reflex irritation starting from the viscera, (2) admission of an abnormal amount of potassium into the blood through the relaxed vessels, (3) possibly a partial reduction of the nitrate to the *poisonous nitrite*.

Skin and kidneys.—It is slightly **diaphoretic**. Its action on the kidneys is similar to that of the potassium chlorate, but more **powerful**. It is passed with the urine **unchanged**.

THERAPEUTICS.

Externally.—A concentrated solution of nitre with or without indigo blue is frequently applied by Indian mothers to the abdomen of infants to relieve tympanites or to produce diuresis.

Internally.—Nowadays its use is almost discarded. The tablets can be slowly sucked in **relaxed sore throat**. Formerly it was employed in almost every **febrile and inflammatory** disease, but now only on rare occasions. The writer has at times observed very good effects in **acute pleurisy** of asthenic type. He gives it with antimonial wine. It is no longer used in **rheumatism**, but it is a capital remedy for arresting the onset of a **gouty attack**, or for removing the headache due to a debauch. 20 grs. of nitre with 30 grs. of potassium bicarbonate in a tumbler of soda water is the best method of administration in such cases. In inflammatory conditions of the **trachea** and **bronchi**, it is still considered a reliable antiphlogistic and expectorant. As an inhalation it cuts short an **asthmatic fit** remarkably well, and hence it is the basis of many nostrums, such as Himrod's Cure, Green Mountain, &c. Charta nitrata or charta nitrata et chlorata can be burnt, and the fumes inhalated. As a diuretic, preference is given to potassium acetate and citrate.

Caution.—Its use is to be avoided in inflammation of the stomach, intestines, bladder and kidneys, and cardiac weakness.

POTASSII PERMANGANAS.

Potassium Permanganate. $K_2Mn_2O_8$.

Source.—May be prepared by the interaction of potassium chlorate, potassium hydroxide and manganese dioxide. $3KHO + KClO_3 + 3MnO_2 = 3K_2MnO_4 + KCl + 3H_2O$. The potassium manganate becomes permanganate by boiling thus—$3K_2MnO_4 + 2H_2O = K_2Mn_2O_8 + 4KHO + MnO_2$.

Characters.—Dark, purple, slender, prismatic, iridescent crystals; taste sweet, astringent. *Solubility.*—1 in 10 of cold water. *Impurities.*—Carbonates, chlorides, sulphates and dioxide of manganese.

Incompatibles.—Oxidisable substances, especially organic ones, and any reducing agent.

Action.—Antiseptic, deodorant, emmenagogue.

B.P. Dose.—1 to 3 grs. with kaolin (see p. 86) or in solution.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Official Preparation.

1. **Liquor Potassii Permanganatis.**—1 in 110 ms. Of a disagreeable taste. **Condy's fluid** is only of half the strength.

B.P. Dose.—2 to 4 drs. in distilled water.

Non-Official Preparations.

1. **Calcium Permanganate.** *Syn.*—*Monol.*—Brown, deliquescent crystals; soluble in water. Sterilises water (1 in 100,000). Said to be useful in enteritis and diarrhœa of children. *Dose.*—1 to 2 grs.

2. **Sodium Permanganate.**—Green, soluble in water. A cheap antiseptic.

3. **Zinc Permanganate.**—Violet brown, deliquescent, soluble in water. Powerful antiseptic and non-irritating; antigonorrhœic as an injection.

Pharmacology.

Externally.—Potassium permanganate in its solid form is an irritant and even caustic, and in solution a stimulant. Apart from its local actions on the human body, it is a valuable **oxidising agent**, giving off oxygen when moist and in the presence of organic matter, thus destroying decomposing ferments and septic germs. Therefore, it is an **antiseptic, deodorant** and **disinfectant.** The only drawback is that the article is expensive and yields up oxygen too quickly, rendering it inert after a short time; consequently its germicidal powers are limited.

Internally.—It is an unstable compound, being decomposed into manganese dioxide in the stomach, in which form it is probably absorbed Manganese salts have **no hæmatinic** property as was once supposed; in fact, nothing definite is known of their action on the blood and tissues. When injected into the blood, or subcutaneously, they are excreted by the intestine and kidneys. Ringer considers it a useful **emmenagogue.** He has not seen abortion follow its use, though others have done so.

Therapeutics.

Externally.—For rapidly disinfecting stools and foul discharges, washing bed-pans, articles, and hands after contact with infectious diseases, for flushing water closets and drains, potassium permanganate in solution (1 in 150) is an excellent antiseptic and deodorant. Being odourless and non-irritant, it is best suited for use at the bedside. Fabrics are stained by it, but the stain is easily removed by sulphurous acid, but they must be immediately washed, otherwise they would be damaged by the sulphuric acid formed. A weaker lotion (2 grs. to 10 ozs. of distilled water) can be used as a wash for **foul or suppurating ulcers, abscesses, ozœna**; or as a uterine or vaginal douche after **parturition** or in **cancer of the os.** As an injection (½ gr. to 1 oz) in **gonorrhœa** and (1 gr. to 1 oz) in **gleet,** it has given good results.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

A lotion (1 gr. to 2 ozs.) can be used with benefit in **burns, scalds** and **frost bites**. A saturated solution (1 in 20) is an excellent application in **bites** by poisonous snakes and rabid dogs, if it can be immediately applied A 15 p c solution can also be freely injected into the subcutaneous tissues for this purpose, but it must be noted that its contact with the virus is essential and therefore it is useless to try it some hours after the bite has been inflicted and when the virus has entered the circulation. It is largely employed in dyeing white hair to a chestnut brown.

Internally.—Potassium permanganate makes a very effective gargle (2 grs. to 10 ozs. of the official solution diluted to 1 in 50) in **foul** and **ulcerative** diseases of the gums, mouth and throat, such as **ulcerative** and **gangrenous stomatitis**. On account of its powerful oxidising property, it is the best **antidote** for opium and morphine poisoning, if it can be given soon after the swallowing of the poison (see p. 524). It is also a successful antidote to phosphorus poisoning. As an emmenagogue it is strongly recommended in **delayed, deficient** or **arrested menstruation**, but the writer has not found much benefit from its use. It is no longer used in **diabetes, infective fevers** or **anæmia**. It can be given in pill or solution. There is a danger of ulceration being caused by the tablets. Liqr. Pot. Permanganatis is disagreeable to swallow.

POTASSII SULPHAS. Potassium Sulphate.

K_2SO_4.

Source.—May be obtained by purifying the crude salt, or by the interaction of sulphuric acid and potassium chloride or some other potassium salts.

Characters.—Colourless, hard, rhombic prisms, terminated by 6 sided pyramids. *Solubility.*—1 in 10 of cold and 1 in 4 of boiling water. *Impurities.*—Chlorides, nitrates and other metals.

Action.—A mild cathartic. **B.P. Dose.**—10 to 40 grs.

Enters into.—Pil. Colocynth. Co., Pulv. Ipecac Co. and their preparations.—Pil. Colocynth et Hyos. and Pil. Ipecac c. Scilla.

Non-Official Preparation.

1. **Sal Polychrestum.** *Syn.*—*Glaser's Salt*—A mixture of Potassium Sulphate and Sulphite. In Dyspepsia and chronic skin diseases. *Dose.*—30 to 120 grs.

Pharmacology and Therapeutics.

Internally.—It is a mild **saline purgative**, acting by stimulating the glandular secretion of the intestine, and is a **hepatic stimulant**. In pharmacy, it is chiefly used to help the pulverization of tough substances, as ipecacuanha root. Therapeutically it is rarely used.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Additional Preparations of Potassium.

1. **Potassii Auro-Cyanidum.**—White soluble crystals. Prevents the growth of anthrax bacilli when injected into the blood.
2. **Potassii Benzoas.**—See page 271.
3. **Potassii Cantharidas.**—See page 310.
4. **Potassii Cobalto-nitris.**—Yellow crystals, slightly soluble. Causes less discomfort than other nitrites. In uræmic dyspnœa and asthma. *Dose.*—½ gr.
5. **Pot. Glycerophosphas.** (Merck).—50 p. c. solution. Soluble in water. Nervine tonic. In neurasthenia, phosphaturia *Dose.*—3 to 4 grs. in normal saline solution hypodermically.
6. **Potassii Hypophosphis.**—Explodes when triturated or heated with nitrate, chlorate or other oxidiser. Alterative. *Dose.*—1 to 6 grs.
7. **Potassii Nitris.**—A crystalline deliquescent powder, used as a vaso-dilator in migraine, asthma, epilepsy. *Dose.*—¼ to 1½ grs.

A powder consisting of Pot Nitris ½ gr., Pot. Nitras 18 grs., and Pot. Bicarb. 25 grs., given in a tumbler of water early in the morning, reduces blood pressure and has checked recurrent epistaxis. It may be tried in gout.

8. **Potassium Osmate.**—Reddish crystalline powder, soluble in water. With bromides in epilepsy, and hypodermically in sciatica and other neuralgias. *Dose.*—$\frac{1}{10}$ gr. per day.
9. **Potassii Phosphas.**—A deliquescent, granular powder. Alterative in phthisis, rheumatism, &c. *Dose.*—1 to 10 grs.
10. **Potassii Salicylas.**—See page 195.
11. **Potassii Succinas.**—A deliquescent powder. Hæmostatic. *Dose.*—5 to 10 grs.
12. **Potassii Telluras.**—White, crystalline, soluble. Reduces or arrests night and day sweats of phthisis. Communicates a garlic odour to the breath. *Dose.*—⅛ gr. in pill daily.

PRUNI VIRGINIANÆ CORTEX.

Virginian Prune Bark. N. O. *Rosaceæ.*

Syn.—Wild Cherry Bark.

Habitat.—North America.

Source.—The bark of *Prunus serotina*, collected in autumn.

Characters.—Curved pieces or irregular fragments, $\frac{1}{12}$ in. thick. Young bark smooth, reddish-brown, marked with transversely elongated lenticels, and granular fracture. Old bark rough and nut-brown. Taste astringent, aromatic, bitter. Odour, after maceration with water, like bitter almonds.

Composition.—(1) *Amygdalin*, (2) *Emulsin*, which yields hydrocyanic acid in the presence of water. (3) *Volatile oil*, &c.

Action.—Nervine sedative and a flavouring agent.

Official Preparations.

1. **Syrup. Pruni Virginianæ.**—3 in 20. B.P. Dose.—½ to 1 dr.
2. **Tinctura Pruni Virginianæ.**—1 in 5. B.P. Dose.—½ to 1 dr.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology.

Internally.—The Virginian prune bark possesses very mild **stomachic** and **tonic** virtues, which are greatly antagonised by the tannin it contains. Its liquid preparations are **sedative**, because minute quantities of hydrocyanic acid are formed during the process of preparation.

Therapeutics.

Internally.—Because both the syrup and the tincture contain essential oil, they are used as **flavouring** agents. The syrup is largely employed as a sweetening and flavouring agent in cough mixtures, but it can also allay **cough** in tea-spoonful doses, on account of its sedative virtues. The tincture is recommended in **dyspepsia, chronic bronchitis, fatty heart, palpitation, mitral regurgitation,** &c.

PRUNUM. Prunes.

N. O. *Rosaceæ.*

Habitat.—South of France.

Source.—The dried ripe fruits of *Prunus domestica.*

Characters.—Ovoid or oblong 1¼ in. long, black, shrivelled; pulp brownish, without marked odour; Taste sweet, bland, acidulous.

Composition.—(1) *Sugar.* (2) *Malic acid.* (3) a purgative principle.

Action.—A gentle aperient. **Enters into.**—Conf. Sennæ.

Pharmacology and Therapeutics.

Internally.—Prunes are slightly **laxative, demulcent** and **nutritive**, and are therefore largely consumed as an article of food, especially by those who suffer from habitual constipation. When stewed they make a tempting dish for constipated children.

PTEROCARPI LIGNUM.

Red Sanders-Wood. N. O. *Leguminosæ.*

Syn. B.P.—Red Sandal Wood. **Syn. I.V.**—*Raktachandan,* Beng. *Lal Chandan,* Hind.

Habitat.—Southern India and Ceylon.

Source.—The heart-wood of *Pterocarpus santalinus.*

Characters.—Large heavy logs; dark reddish-brown externally; deep blood-red internally; taste slightly astringent; odour faintly aromatic.

Resembles.—Logwood which is less dense and more astringent.

Composition.—(1) *Santalic acid* or *Santalin.* (2) a *resinoid principle,* blood red.

Use.

It is only used to colour compound tincture of lavender.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PULSATILLA. Wood Anemone. (*Non-Off.*)

N.O. *Ranunculaceæ.*

Syn.—Pasque flower, windflower.
Habitat.—England, Germany.
Source.—The flowering herb of *Anemone Pulsatilla.*

Non-Official Preparations.

1. **Anemonin.** *Syn.—Pulsatilla Camphor.*—White crystals, easily crumbled, sparingly soluble in water. *Dose.*—$\frac{1}{60}$ to $\frac{1}{12}$ gr.
2. **Tinctura Pulsatillæ. B.P.C.** (1 in 10). *Dose.*—1 to 5 ms.

Pharmacology and Therapeutics.

It paralyses the medulla oblongata and spinal cord, having especial influence upon the cardiac and respiratory centres. It slows the hearts action and diminishes voluntary movement. It also has a specific action upon the generative organs. Useful in **bronchitis, pertussis** and **asthma,** but its special value is in the treatment of **epididymitis, orchitis** and **dysmenorrhœa.** Tincture of Pulsatilla, given in doses of 1 minim every hour until the pain abates, is almost a specific for acute orchitis, and usually gives complete relief within 24 hours. For the treatment of dysmenorrhœa it is usual to combine Pulsatilla with Caulophyllin, the active principle of *Caulophyllum Thalictroides,* the blue cohosh or squash root. A convenient form of administration is Oppenhemer's Liquor Caulophylli et Pulsatillæ, the dose of which is 1 to 2 drs. given in water three times a day. It should be commenced a week before the period is expected and continued until the flow is fully established.

PYRETHRI RADIX. Pyrethrum Root.

N.O. *Compositæ.*

Syn.—Pellitory root. **Syn. I.V.**—*Akarkara* Beng. Hind.
Habitat.—Algeria, Levant.
Source.—The dried root of *Anacyclus pyrethrum.*
Characters.—Unbranched pieces, 2 to 4 in. long, $\frac{1}{4}$ in. or more thick, cylindrical, or tapering towards both extremities; the crown bearing a tuft of colourless hairs. Brown externally, and wrinkled longitudinally. Fracture short. Odour characteristic. Taste pungent, excites a copious flow of saliva when chewed. Easily recognised by the pricking sensation when chewed.
Resembles.—*Taraxacum* which is darker and has a bitter taste only.
Composition.—(1) *Volatile oils.* (2) *Resins.* (3) *Inulin,* a white powder resembling starch.
Action.—Powerful sialagogue.

Official Preparation.

1. **Tinctura Pyrethri.**—1 in 5. Dark sherry coloured.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pharmacology and Therapeutics.

Internally.—Pellitory root when chewed produces a burning sensation, soon followed by tingling, numbness, and copious secretion of saliva, from the stimulation of the nerves and blood vessels, and those of the salivary glands. After a while the nerves are depressed. It is therefore a **powerful sialagogue**, and a slight **anæsthetic**. On account of these properties, it is used to relieve **toothache**, **relaxed uvula** and **sorethroat**. It is also serviceable in **paralysis of the tongue** for it stimulates its nerves. The tincture can be put within a carious tooth, and can be used as a **gargle** (1 dr. to 2 ozs.). Roth speaks well of it in **globus hystericus**.

PYROXYLINUM.

See page 424.

QUASSIÆ LIGNUM. Quassia Wood.

N. O. *Simarubaceæ.*

Habitat.—Jamaica.

Source.—The wood of the trunk and branches of *Picræna excelsa*.

Characters.—Logs exceeding 6 in. in diameter, yellowish-white, tough, dense, but easily split. Inodorous. Taste intensely bitter. Often seen in chips, or shavings.

Resembles.—Sassafras, which is aromatic and not bitter.

Composition.—(1) *Quassin*, a bitter principle. (2) A *volatile oil*. Contains no tannin.

Action.—A simple bitter.

Official Preparations.

1. **Infusum Quassiæ.**—88 grs. to 1 pint., (¼ hour).
B.P. Dose.—½ to 1 oz.
2. **Liquor Quassiæ Concentratus.**—1 in 10.
B.P. Dose.—½ to 1 dr.
3. **Tinctura Quassiæ.**—1 in. 10. Straw coloured.
B.P. Dose.—½ to 1 dr.

Non-Official Preparation and Substitute.

1. **Quassin.**—A white crystalline neutral body slightly soluble in water. Stomachic, tonic. *Dose.*—$\frac{1}{10}$ to ½ gr.
2. The wood of **Picrasma Quassioides** (*Charangi, Beng.*) is not so bitter as true quassia, though it contains the same bitter principle *quassin*. The bark and root being more bitter. It can be used as a substitute.

Pharmacology and Therapeutics.

Internally.—Quassia wood closely resembles calumba in actions and uses. It is a **pure bitter** without astringency, and acts as a poison to flies, fish, and worms infesting the rectum of human

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

subjects. Being devoid of flavour, it is intensely bitter and is therefore not so agreeable to the stomach as gentian or chiretta. It can be given in the same class of cases where calumba or gentian is indicated, but being free from tannic acid, it can be combined with iron. A strong infusion makes an excellent **anthelmintic enema** for thread worms.

QUILLAIÆ CORTEX. Quillaia Bark.

N.O. *Rosaceæ.*

Syn. B.P.—Panama Bark; Soap Bark.

Habitat.—Chili.

Source.—The inner part of the bark of *Quillaia saponaria.*

Characters.—Flat pieces ½ in. thick, 2 ft. long, 4 in. wide. Outer surface brownish-white, or reddish-brown; inner surface smooth, white or yellowish-white. Taste astringent, acrid. Powder irritates nostrils.

Composition.—(1) *Sapotoxin* and (2) *Quillaic acid*, closely allied to Saponin (See Senega root.)

Action.—Emulsifier and expectorant. **Enters into.**—The preparation of Liq. Picis Carbonis and the

Official Preparation.

1. **Tinctura Quillaiæ.**—1 in 20. **B.P. Dose.**—½ to 1 dr.

Pharmacology and Therapeutics.

Externally.—The powdered soap bark is very irritant to the nostrils, giving rise to a nasal discharge, sneezing, and sometimes cough, and its inhalation is therefore recommended in acute and chronic catarrhal **rhinitis.** It is a local stimulant to **chronic ulcers**, and Shoemaker has been very successful in treating cases of this description by the application of bandages soaked in the infusion. He treats **pityriasis, dandruff, bromidrosis, hyperidrosis** in the same manner.

Internally.—Quillaia bark contains five times more *saponin* or senegin than senega, and is therefore a more powerful **expectorant.** It may be given in **chronic bronchitis**, and **emphysema** with deficient expectoration, but its use is contra-indicated in hæmoptysis, or ulceration of the throat and alimentary canal, on account of its irritant properties. Because it contains a large percentage of saponin, it is largely employed for **emulsifying** insoluble drugs: the only objection to its free use is that *sapotoxin*, which is an ingredient of saponin, is a dangerous blood poison, breaking up the blood corpuscles. It is said to be useful in **amenorrhœa.** The decoction may be used as a substitute for inf. senega.

QUININÆ HYDROCHLORIDUM.

See page 316.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

RESINA. Resin.

N.O. *Coniferæ.*

Syn.—Rosin.

Source.—The residue left after the distillation of the oil of turpentine from the crude oleo-resin (turpentine) of various species of *Pinus.*

Characters.—Translucent, light amber coloured, compact, brittle, pulverisable; fracture shining; odour and taste terebinthinate. Burns with yellow flame and much smoke. *Solubility.*—Freely in alcohol (90 p.c.), ether, benzol, carbon bisulphide.

Composition.—The chief constituent is an organic acid, *Abietic acid,* which is converted into a soluble salt by alkalies.

Enters into.—The preparation of 8 plasters and the

Official Preparations.

1. **Emplastrum Resinæ.** *Syn. B.P.—Adhesive Plaster.*—1 in 9½. A pale yellow solid.

2. **Unguentum Resinæ.** *Syn.—Basilicon Ointment.*—1 in 4 nearly. A yellowish-brown stiff ointment. Stimulant to indolent sores.

Non-Official Preparation.

1. **Resinol.** *Syn.—Rosinol, Retinol.*—A non-saponifiable, non-irritant, yellowish, oily product of dry distillation of resin. Dissolves phosphorus, naphthol, camphor, creosote, cocaine, iodoi, aristol, &c., and makes a good non-irritating stable basis for ointment. Powerfully **antiseptic** and **antipruritic.** Used in eczema, impetigo, scabies, hæmorrhoids. Internally, in rheumatism bronchitis, gonorrhœa. *Dose*—1 dr. in capsules.

Pharmacology and Therapeutics.

Externally.—Resin is **antiseptic** and mildly **stimulant,** and is therefore useful in indolent **ulcers, wounds,** and **sores.** Basilicon ointment is an excellent application for this purpose, but is apt to prove too stimulating if used for any length of time. Its chief use now is in pharmacy, to impart consistence and adhesiveness to plasters and ointments.

RHEI RADIX. Rhubarb Root.

N. O. *Polygonaceæ.*

Syn.—Turkey Rhubarb.

Habitat.—China and Thibet.

Source.—The erect rhizome or so called root of *Rheum palmatum, Rheum officinale,* and other species, deprived more or less of its cortex and dried.

Characters.—In cylindrical, barrel-shaped, conical, plano-convex, or irregular pieces. The surface sometimes covered with a bright-yellowish-brown powder. Rounded or angular, smooth, showing beneath dark red

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

lines, intermixed with the reddish-brown substance of the root, usually presenting small, scattered, star-like marks. Frequently the pieces are bored with a hole which sometimes contains the remains of the cord used to suspend them while drying. The root is hard and compact, presenting a marbled, red and white appearance. Odour characteristic, aromatic. Taste slightly bitter, astringent, and gritty. *Impurities.*—English rhubarb, which has a different taste, odour, and an excess of starch. Turmeric, which becomes brown on additon of boric acid.

Composition.—(1) *Chrysarobin* is the chief, and is the colouring and purgative principle. (2) *Chrysophanic acid*, probably formed by the oxidation of chrysarobin. (3) *Rheo-tannic acid*, (4) Oxalate of lime (35 p.c.). (5) Other substances, as *emodin*, *phaolin*, ?heumic acid, resin, starch, &c.

Action.—Stomachic tonic, astringent purgative.

B.P. Dose.—3 to 10 grs. for repeated use; 15 to 30 grs. for a single dose. 3 grs. for a child 1 year old.

Official Preparations.

1. **Extractum Rhei.**—A brown dry extract.
B.P. Dose.—2 to 8 grs.
2. **Infusum Rhei.**—1 in 20 (½ hour). **B.P. Dose.**—½ to 1 oz.
3. **Liquor Rhei Concentratus.**—1 in 2. **B.P. Dose.**—½ to 1 dr.
4. **Pilula Rhei Composita.**—1 in 4 (nearly). **B.P. Dose.**—4 to 8 grs.
5. **Pulvis Rhei Compositus.** *Syn.—Gregory's Powder.*—Pale yellow. Antacid, stomachic, purgative. **B.P. Dose.**—20 to 60 grs. in milk. 5 grs. for a child 1 year old.
6. **Syrupus Rhei.**—1 in 15. Brown, thick. **B.P. Dose.**—½ to 2 drs.; ½ dr. for a child 1 year old. The B. P. formula is unsatisfactory. Squire recommends a (1 in 4) fluid extract of rhubarb with alcohol (60 p.c.). Evaporate 8 ozs. to 3 ozs. Mix this and oil of coriander 5 ms., with sugar 24 ozs. and water to 40 ozs. by weight. Dissolve without heat and strain.
7. **Tinctura Rhei Composita.**—1 in 10. Dark-brown.
B.P. Dose.—½ to 1 dr. for repeated use; 2 to 4 drs. for a single dose.

Non-Official Preparation.

1. **Elixir Rhei, B.P.C.**—Rhubarb 5 ozs., Fennel 2 ozs. Macerated repeatedly with alcohol and water (1 in 3) *q. s.*; and to the resulting tincture, add Glycerin 3 ozs. and Sugar 4 ozs; the whole quantity being 30 ozs. *Dose.*—1 to 3 drs.

Pharmacology.

Externally.—The percentage of chrysarobin in rhubarb is not enough to produce any local action by direct application.

Internally. **Alimentary canal and liver.**—Rhubarb tinges the saliva and increases its flow. In small doses (2 to 5 grs.), it stimulates the secretion of the gastric juice and the peristalsis of the stomach. It is therefore a **stomachic and tonic.** In the intestine, it performs two definite functions. (1) In large doses (20 to 30 grs.), it increases the secretion of the intestinal glands

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

and the peristaltic movements, and thus acts as a mild **purgative**. Purging occurs within 4 to 8 hours, often accompanied by griping, and the stool is liquid and yellow, the colour being derived from the excess of bile, and chrysarobin, the pigment and the purgative principle. (2) After opening the bowels, the rheo-tannic acid in the rhubarb constipates by arresting the glandular secretion of the intestine. This **astringent** action may also be produced by small doses of the drug ; but it must be noted that the action of rheo-tannic acid is slower than that of chrysarobin.

Some of the ingredients of rhubarb are absorbed into the blood, and go to stimulate the secretion of bile, without affecting any of the biliary constituents. The flow of bile is not so copious as to cause purgation. Therefore, it is a mild **hepatic stimulant**.

Elimination.—Chrysarobin has been found in the milk, and largely in the urine, both of which are coloured by it. It makes the milk bitter and purgative. Rheo-tannic acid is excreted by the bowels.

THERAPEUTICS.

Externally.—As chrysophanic acid is excreted in the perspiration, it may be given internally in **psoriasis**, but it is never administered with this object

Internally.—Rhubarb is largely employed in **infantile ailments**. It is an excellent remedy for the **dyspepsia** of children, especially when caused by a faulty diet. It expels undigested food, and produces first a soothing and afterwards an astringent effect. Goodeve's Red mixture (see p. 490) is largely employed for this purpose in this country. In fact, it is one of our everyday nursery remedies. Similarly, it is most effective in controlling **infantile diarrhœa**, produced by undigested food, or other irritating matter ; here we look for the after astringent effect. Gregory's powder, which may be administered in milk, is a very useful aperient in many **gastric and abdominal troubles** of childhood. Syrupus Rhei or Elixir Rhei may be used instead, as they are palatable and do not gripe. As a pure purgative, it cannot be prescribed alone, on account of its griping and after constipating properties, but combined with an equal quantity of soda, or with other purgatives, as Pil Rhei. Co., it may be given for this purpose. A full dose of Gregory's powder often cuts short an attack of **mucous diarrhœa** or **dysentery**, if given at the onset. Many praise it in **piles**, and consider it more effective if slowly chewed.

RHŒADOS PETALA. Red poppy Petals.

N. O. *Papaveraceæ.*

Syn. I. V.—*Lál posta*, Beng. *Rakta-posta*, Sans.

Source.—The fresh petals of *Papaver Rhœas*.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Bright scarlet, transversely elliptical, about 2 in. broad. Odour characteristic and taste slightly bitter.

Composition.—(1) *Rhœadic* and *Papaveric acid*, said to be the colouring principles. A non-poisonous principle. (2) *Rhœadine*. No morphine.

Official Preparation.

1. **Syrupus Rhœados.**—1 in 3½. **B.P. Dose.**—½ to 1 dr.

Uses.

The syrup is sometimes used to allay cough in children, but the chief use of the petals is as a colouring agent.

RICINI OLEUM. Castor Oil.

N. O. *Euphorbiaceæ*.

Syn. I. V.—*Bherándá Tel*, Beng. *Arand Tel, Rendi Tel.* Hind.

Habitat.—India, chiefly cultivated in Bengal, Madras, and Bombay.

Source.—The oil expressed from the seeds of *Ricinus communis*.

Characters.—Viscid, colourless or faintly yellow. Odour faint, taste bland at first, acrid and unpleasant afterwards. *Solubility.*—1 in 5 of alcohol (90 p. c.), entirely in absolute alcohol, ether and oil of turpentine. *Impurities.*—Oil of the inferior castor oil seeds, cotton seed oil, *Mohua oil* and other fixed oils.

There are several varieties of oil, but the oil expressed by Mitchel's process without heat, known as "cold-drawn," should be used for medicinal purposes.

Characters of the seeds.—Oval, compressed, shining, marbled with reddish-brown or blackish-brown spots or stripes. Kernel white, albuminous, enclosing a large dicotyledonous leaf.

Resembles.—Croton oil seeds (see page 371.)

Composition.—Chemistry is not yet complete. (1) *Glyceryl Ricinoleate*; (2) *Ricinine*, an alkaloid, not purgative. (3) *Ricinoleic acid*, believed to be the purgative principle. (4) *Ricin*, an albuminoid poisonous body to whose presence is attributed the fact that three seeds prove fatal to an adult man. (5) Palmitin, stearin, resin, &c.

Action.—Purgative. **B.P. Dose.**—1 to 8 drs. daily.; 1 dr. for a child 1 year old.

Enters into.—Collod. Flex., Lint. Sinapis. Co., Pil. Hyd. Sub. Co. and the

Official Preparation.

1. **Mistura Olei Ricini.**—3 drs. in 1 oz. B. P. has wisely dispensed with saponification. Is now emulsified. Purgative.
B.P. Dose.—1 to 2 ozs. as a draught.

Non-Official Preparations.

1. **Capsules of Castor Oil.**—30 or 60 ms. in each flexible capsule.
2. **Enema Olei Ricini.**—Castor oil 2 ozs. Mucilage of Starch to 1 pint.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY.

Externally.—Like almond oil and olive oil, it is **bland and unirritating.** Rubbed into the skin, or injected into a vein or the rectum, it purges. It is said to **increase the secretion of milk** when applied to the breasts, but poultices of the leaves of the castor oil plant are more effectual.

Internally. **Gastro-intestinal tract.**—Its local action on the stomach is the same as on the skin, unless it is rancid, when it causes nausea, eructations and vomiting. In the duodenum pancreatic juice decomposes it, setting free *ricinoleic acid*, believed to be its purgative principle. It gently stimulates intestinal glands and peristalsis, and is a painless, speedy, certain and fairly **mild purgative,** operating within 4 to 6 hours. The stools are two to four in number, soft or semiliquid, but not watery, the oil being expelled with the last ones and occasionally creating griping. A portion of the oil is no doubt absorbed and when excreted by the mammary gland it may cause purgation to suckling babies. Some patients get habituated to its use, and in others it sets up after constipation like rhubarb. It is therefore unsuitable in habitual constipation.

THERAPEUTICS.

Externally.—It may be used like olive or almond oil. A drop of castor oil let fall on the conjunctiva **allays irritation** caused by a **foreign body.** It is employed as a basis of many hair-oils and pomades. According to Ringer, a daily application of castor oil removes **warts** within 4 to 6 weeks. It has been found sometimes to allay pain, and remove the stiffness of chronic articular rheumatism.

Internally.—It is the safest and **best purgative for children, the old and infirm, delicate females, women during and after pregnancy,** and persons subject to piles and fissure of the anus. In **abdominal operations, pelvic diseases. peritonitis, fevers,** especially in the constipation of typhoid fever, and **before or after a dose of santonin,** castor oil is the safest purgative to be used. **Diarrhœa,** infantile or otherwise, caused by indigestible or undigested food, yields to a dose of castor oil with or without a minute dose of Tr. Opii. It is an excellent remedy for **acute dysentery,** when given with opium which prevents griping, at the very onset (Castor oil 2 to 4 drs. and Tr. Opii 10 to 20 ms.). Similarly in small doses (15 to 20 ms. with 5 to 10 ms. of Tr. Opii emulsified) it is serviceable in the **chronic variety.** As an **enema** it has been given with success in impaction of the large intestine and rectum. It may be rubbed over the stomach of children, in constipation.

Dosage and mode of administration.—The writer has seen that a minimum dose of 30 ms. and a maximum dose of 8 ozs.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

were required to open the bowels of an adult. As a rule he never uses more than 4 to 6 drs. for a single dose to an adult. Children can bear sometimes large doses. A small tea-spoonful is not a large dose for a new-born babe. The cold-drawn castor oil is almost tasteless and can be given in the same way as cod-liver oil (see p. 499). However, the disagreeable smell and greasy and sickening taste can be very well covered by **emulsification** with mucilage of acacia, as in Mist. Olei Ricini, or with yolk of eggs, or by giving in **capsules**. The oil must be warmed in cold weather, before administration. Taken floating on hot coffee or half a tea-cup of warm-water drunk two hours after a dose of the oil, often helps its operation. Food retards or delays its action. It is said that a few drops of oil of turpentine mixed with the oil increases its purgative effect.

ROSÆ GALLICÆ PETALA.

Red-Rose Petals. N.O. *Rosaceæ.*

Syn. I.V.—*Goldp ful*, Beng. *Guldb ka pdpri* Hind.

Habitat.—Britain and France.

Source.—The fresh and dried unexpanded petals of *Rosa gallica*, from cultivated plants

Characters.—Little cone-like masses, or separate, purplish-red, velvety petals. Odour fragrant, roselike. Taste bitter, feebly acid and astringent.

Composition.—(1) *Oil of Rose* (*off*). (2) *Tannic* and *Gallic acids.*

Action.—Astringent. Used for colouring.

Official Preparations.

1. **Confectio Rosæ Gallicæ.**—1 in 4. A soft violet-coloured mass. Used as an excipient for pills.

2. **Infusum Rosæ Acidum.**—1 in 40 (¼ hour). Bright red. Astringent. **B.P. Dose.**—½ to 1 oz.

3. **Syrupus Rosæ.**—1 in 17. Red. Used for colouring. **B.P. Dose.**—½ to 1 dr.

ROSÆ OLEUM. Oil of Rose.

Syn. B.P.—Otto of Rose.

Source.—The oil distilled from the fresh flowers of *Ro damascena.*

Characters.—Pale yellow, crystalline semi-solid; odour strong, fragrant, of rose. Taste sweet. Sp. gr. 0·856 to 0·860.

Official Preparations.

1. **Aqua Rosæ.**—A saturated solution of the oil of rose, commercially prepared by distillation from Damask Rose. *Enters into.*—Mist. Ferri Co. and rose basis for lozenges.

2. **Unguentum Aquæ Rosæ.** *Syn. Cold Cream.*—1 in 4 nearly. A pleasant, fragrant and emollient application.

Wellcome Library, London. Wellcome Trust Collection. Digitized by eGangotri

Actions and Uses.

All preparations of rose are agreeable and fragrant vehicles. The infusion contains sulphuric acid, and is considered efficacious in hæmoptysis, consumptive sweats and as a gargle in relaxed sore throat. Eye-washes are often made of rose-water.

ROSMARINI OLEUM. Oil of Rosemary.

N.O. *Labiatæ*.

Habitat.—South of Europe and England.

Source.—The oil distilled from the flowering tops of *Rosmarinus officinalis*.

Characters.—Colourless or pale yellow; odour of rosemary; taste warm camphoraceous. Sp. gr. 0·900 to 0·915. *Solubility.*—2 in 1 of alcohol (90 p.c.).

Composition.—(1) *Terpene*. (2) *Stearoptene*. (3) *Camphor* ($C_{10}H_{16}O$) and *borneol* ($C_{10}H_{18}O$) in variable proportions. *Impurity.*—Oil of turpentine.

Action.—Rubefacient, stimulant, carminative.

B.P. Dose.—½ to 3 ms.

Enters into.—Lint. Saponis, Tr. Lavend. Co., and the

Official Preparation.

1. **Spiritus Rosmarini.**—1 in 10. *Dose.*—5 to 30 ms.

Pharmacology and Therapeutics.

Externally.—It is a stimulant and rubefacient to the skin, and is commonly used in the form of hair oil or hair wash, to promote the growth of hair on the scalp in baldness. It is combined with liniments for its odour.

Internally.—It is a powerful stimulant, antispasmodic, and carminative, like aromatic oils. It is rarely used internally. Whitla recommends the following as a valuable application in baldness.—Olei Rosmarini ℥iv, Liq. Epispastici ℥ii, Ol. Amygdal. dulc. ℥iss, Spt. Camph. ℥ii. Glycer. Borici ℥i, Ol. Rosæ m. viii, Tr. Jaborandi ℥i. Mix. A little to be rubbed into the roots of the hair every night.

SACCHARUM LACTIS.

Milk sugar. $C_{12}H_{22}O_{11}$, H_2O.

Syn. B.P.—Lactose.

Source.—A crystallised sugar obtained from the whey of milk.

Characters.—Crystals or a crystalline mass, greyish-white, hard, odourless, faintly sweet. *Solubility.*—1 in 7 of cold, and 1 in 1 of boiling water.

Enters into.—The preparation of Ext. Belladonnæ Alcohol., Ext. Nucis Vom., Ext. Opii, Ext. Physos., Ext. Stroph., and Pulv. Elaterin. Co.

CC-0. Thanavaridhi Institute of Ayurvedic Medicine. Digitized by eGangotri

Non-Official and allied Preparations.

1. **Human Milk. Artificial.** (Frankland).—Heat ½ pint of skimmed cow's milk to 90° F. and add rennet. After 10 to 15 minutes break up finely the curd thus formed and strain. After adding 110 grs. of milk sugar, boil the whey. Strain again, and mix it with ¾ pint of fresh cow's milk, to which two spoonfuls of cream have been added. For older children, a third part only of the casein is to be removed.

2. **Koumiss or Kumyss, Artificial.**—True koumiss as prepared by the Tartars is a fermented mare's milk. Artificial koumiss may be brewed at home from cow's milk by any of the following processes. Dissolve grape sugar ½ oz. in water 4 ozs. and yeast 20 grs. in cow's milk 4 ozs. Pour them into a quart bottle, and fill it up with milk. Cork and wire it well, and leave it in a cool place, with occasional shaking.

Pour fresh rich butter milk (which remains after the butter has been separated by churning) 1 part, water 2 parts, cow's milk 8 parts into a loosely covered jar or bottle and keep it in a warm place, say near a fire, for 36 to 48 hours, with frequent brisk shaking. A slightly effervescing rather sharp tasted fluid is the result. Its casein being partially digested by the fermentation of the sugar, koumiss is an easily assimilable nutritious food and remedy, most invaluable in the **wasting diseases of the lung**, in which case, it can be taken *ad libitum*. It is borne by stomachs which refuse cod-liver oil. It is also very useful in **dyspepsia, infantile diarrhœa, kidney diseases**, and, in short, in any lingering disease.

3. **Kefir.**—Is a fermented milk like koumiss, the ferment being a Caucasian mushroom. It can also be made at home by kefir-ferment, which is a hard yellowish-brown granular body, collected from the vessels in which true kefir is made, and sold by druggists. Thus a sparkling beverage is obtained within 24 hours. Useful in **scrofula, anæmia, chest diseases** and **dyspepsia**.

4. **Sanose.**—A palatable, digestive, white, odourless powder, consisting of casein 8, and albumose 2, given with milk or soup. Somewhat similar preparations are sold under the name of **Eucasin, Protene** and **Tropon**.

5. **Nutrose.** *Syn.*—*Sodium Caseinate.*—Colourless, odourless, almost tasteless soluble powder. Non-irritant and easily absorbed, given in **intestinal affections**. *Dose.*—1 to 4 tea-spoonfuls.

6. **Plasmon.**—Soluble unaltered casein, containing the original organic salts, sold in various forms as Biscuits, Cocoa, &c. Possesses nutritive properties and is easily digested.

7. **Sanatogen.**—A similar preparation with the addition of sodium glycerophosphate.

8. **Somatose.**—Dessicated albumoses. Prepared either from milk or meat. Greatly assists **lactation** and when combined with iron as in Ferro-Somatose (q. v.), is useful in **chlorosis** and **anæmia**.

Pharmacology and Therapeutics of Milk Sugar.

Internally.—It greatly increases the flow of urine and is therefore given in **cardiac dropsy** and **albuminuria**. Because it does not ferment in the stomach it is the best sweetening agent in **infantile dyspepsia**, and **irritable conditions of the stomach**. It is considered to be a physiological accelerator of

CC0. Jangamwath Collection. Digitized by eGangotri

labour pains, and for this purpose doses of 5½ to 7 drs. may be given, dissolved in half a pint of milk.

On account of its hardness it is used to facilitate the minute subdivision of other drugs, or to dilute potent substances and bring them up to a uniform standard.

SACCHARUM PURIFICATUM.

Refined Sugar. $C_{12}H_{22}O_{11}$.

Syn. B.P.—Sucrose. **Syn. I. V.**—*Misri*, *Chini*, Beng.

Source.—A crystallised sugar obtained from the juice of the sugar-cane.

Characters.—Well known.

Enters into.—All syrups and lozenges, 3 confections, some mixtures, powders, pills, Liq. Calcis Sac., Sod. Citro. Tart. Effervcs., Mag. Sulph. Efferves. and the

Official Preparations.

1. **Syrupus.**—2 of Sugar and 1 water.
Enters into.—Creosote mixture, Pill of Iron, 9 syrups and Confec. Sulph.
2. **Syrupus Glucosi.** *Syn.*—*Glucosimide.*—As an excipient for pills.

Actions and Uses.

Internally.—Sugar is a food, and tends to produce fat, and to maintain body-heat. It is a **demulcent** and may therefore be given in irritant poisoning, but it is mostly used as a basis of various refrigerent beverages and sharbets. It is added to various pharmaceutical preparations to cover the disagreeable taste of drugs.

SALICINUM. See page 196.

SALOL. See page 200.

SAMBUCI FLORES. Elder Flowers.

N. O. *Caprifoliaceæ.*

Habitat.—Britain.

Source.—The flowers of *Sambucus nigra*, separated from the stalks.

Characters.—Small; calyx superior, five toothed; corolla flat, rotate five-lobed, creamy white, with 5 stamens inserted in the tube; anthers yellow. Taste bitter. Odour not agreeable.

Composition.—(1) *Valerianic acid.* (2) a *Resin.* (3) *Volatile oil.*

Official Preparation.

1. **Aqua Sambuci.**—1 in 1. Colourless. A fragrant basis for skin lotions.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

USES.

Elder flowers are believed to have no action except to perfume lotions. Elder-flower water is popularly used as a cosmetic and to remove freckles. It does not deserve to be retained in the B. P.

SANTALI OLEUM. Oil of Sandal Wood.

N. O. *Santalaceæ.*

Syn.—Oil of Santal wood, Oleum Santali Flavi, Yellow Santal Oil.
Syn. I. V.—*Chandaner tel*, Beng.
Source.—The oil distilled from the wood of *Santalum album*. Chips or raspings of heart-wood which contain the volatile oil, are used for distillation.
Characters.—Pale yellow, viscid, odour strongly aromatic, taste pungent, spicy. Sp. gr. 0 975 to 0. 980. *Solubility.*—1 in 6 of alcohol (90 p. c.). *Impurities.*—Castor oil, cedar wood and copaiba oils.
Composition.—(1) *Santalene a*; (2) *Santalene b* (3) Two *Santalols*, (4) Santalic acid. (5) Various unknown bodies.
Action.—Like copaiba, Anti-gonorrhœic.
B.P. Dose.—5 to 30 ms. in capsules and emulsion.

NON-OFFICIAL PREPARATION.

1. **Capsules of oil of Sandal Wood.**—5 to 10 ms. in each. Midy's capsules contain 5 ms. in each and most reliable. *Dose.*—10 to 12 capsules daily.

PHARMACOLOGY AND THERAPEUTICS.

Externally.—Sandal-wood oil is used in perfumery. In India it is sometimes applied to **scabies** with good effects.

Internally.—Its actions closely resemble those of copaiba. It is absorbed and is eliminated by the kidneys, **genito-urinary** and **bronchial mucous membranes**, which it **stimulates** and **disinfects**, especially the former Posner thinks that it has a specific action on the prostatic portion of the urethra. It is used with great benefit in 15 to 20 m. doses three times a day in **acute** and **chronic gonorrhœa**. When there is much burning, it is a good plan to give small doses (one or two capsules) every hour, to prevent the urine from irritating the mucous membrane. Being more pleasant, it can be given as a **substitute** for copaiba but the combination of the two has given splendid results in the writer's hands. It must be continued for two weeks, to prevent a recurrence, after the discharge is stopped. It has also been found serviceable in **chronic** or **fœtid bronchitis** and **cystitis** in 10 m. doses. A very good *emulsion* may be made by mixing the oil with tragacanth powder and adding quickly water with stirring.

Sandal wood.—Its paste made by rubbing the wood on a rough stone mortar with a little water removes **prickly heat**, mild **local cutaneous inflammation**, such as occurs after vaccina-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

tion, **frontal headache, pruritus** &c., when locally applied. The decoction of the wood is considered as a diaphoretic and a vascular sedative (Æ. Ross).

SANTONINUM. Santonin. $C_{15}H_{18}O_3$.

N. O. *Compositæ.*

Source.—A crystalline principle prepared from Santonica, the dried unexpanded flower-heads or capitula of *Artemisia maritima*, var *Stechmanniana*.

Characters.—Colourless, flat, rhombic prisms, feebly bitter, turning yellow by sunlight. *Solubility.*—Scarcely in cold, sparingly in boiling water; 1 in 4 of chloroform, 1 in 40 of cold and in 1 in 3 of boiling alcohol (90 p. c.).

Action.—A vermicide for round worms.

B.P. Dose.—2 to 5 grs.; ¼ to ½ gr. for a child 1 year old. 1 to 2 grs. for a child 2 to 5 years.

Official Preparations.

1. **Trochiscus Santonini.**—1 gr. in each. *Dose.*—1 to 5.

Non-Official Preparations and Derivatives.

1. **Suppositorium Santonini.**—1 gr. in each. In thread-worms every 2nd or 3rd night 3 times.
2. **Santoninoxim.**—A santonin derivative in white crystalline powder. Less absorbable and non-toxic vermicide. *Dose.*—5 grs. or more, followed by a purgative; given in 2 doses with an interval of 1 or 2 hour.
3. **Sodii Santonas.**—Colourless crystals, soluble in water, turning yellow on exposure to light. *Dose.*—5 to 10 grs. in milk or orange syrup.

Pharmacology.

Internally. **Intestines.**—Santonin is a direct poison to round worms, *Ascaris lumbricoides*, killing them in the intestine. Its action is less marked on thread worms, *Oxyuris vermicularis*, and it has no effect whatever on tapeworms. Some authorities assert it does not kill but paralyses the worms. It is the most valuable **anthelmintic** we have for the round entozoa. This anthelmintic action is possibly due to an unknown oxidation product of santonin formed in the intestine. Santonin does not kill these worms outside the body. In vermicidal doses, it does not purge, but does so when given in larger quantities.

Blood.—Some of the santonin is absorbed and circulates as sodium santonate.

Nervous system.—It produces some curious effects here. Even in medicinal doses, within an hour or two after administration, objects first appear bluish, and then greenish or yellow, due perhaps to a certain disturbance of the retinal fibres, for though there is hyperæmia of the retina, yet the humours and other tissues of the eye are not stained. Taste and smell are sometimes affected.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Kidneys.—Santonin is chiefly excreted by the kidneys, and during its passage, **increases their secretion.** Sometimes, it may create dysuria or incontinence of urine in children. It colours **acid urine greenish yellow,** and **alkaline** urine **purplish red,** referable probably to an unknown oxidation product formed in the system and excreted with the urine.

Generative organs.—Its alleged emmenagogue properties have not been verified.

Toxic action.—In large doses, it causes headache, vomiting, purging, loss of consciousness and speech, cold sweats, depression of the heart and respiration, intense saffron coloured urine, tremor, convulsions and death. Sometimes a rash appears on the skin. Poisoning occurred in a child from 1½ grs. On the other hand recovery has taken place even after swallowing 1 oz. of the drug.

THERAPEUTICS.

Internally.—Santonin is chiefly employed for killing round worms. It should be given at night on an empty stomach, after a mild purge in the morning, followed by a purgative next morning. Calomel is the best purgative to use. To a child 2 or 3 years old 1 to 2 grs. of santonin may safely be given followed by a purgative next morning. The writer always gives it with calomel and sugar, followed, if necessary, by a plain dose of calomel next morning. For **thread worms,** it is best given in the form of an **enema** with castor oil. The suppository may answer as well, but thread worms are best treated by the injection of an infusion of quassia or one of the simple bitters. Santoninoxim being non-poisonous can be used instead, without the risk of evil effects. Its use in **amenorrhœa, dysmenorrhœa, incontinence of urine, colour-blindness, amaurosis, albuminuria,** &c., have not been attended with good results.

SAPO ANIMALIS. Curd Soap.

Source.—Soap made with sodium hydroxide and purified animal fat, consisting principally of stearin; containing about 30 p. c. of water.

Characters.—White or greyish, dry, inodorous, horney and pulverisable when kept in dry warm air. Moulded when heated. *Solubility.*—Soluble in alcohol (90 p. c.), sparingly in cold, but soluble in hot water.

Enters into.—Ext. Colocynth. Co., Lin. Pot. Iod. c. Sapon., Pil. Scammon. Co.

SAPO DURUS. Hard Soap.

Source.—Soap made with sodium hydroxide and olive oil, containing about 30 p. c. of water. It is an oleate of soda and is formed thus.—$C_3H_5(C_{18}H_{33}O_2)_3 + 3NaHO = 3NaC_{18}H_{33}O_2$ (hard soap) $+ C_3H_5(OH)_3$ (Glycerin).

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—The same as above. *Impurities.*—Excess of alkaline hydroxide or carbonate.

Action.—Antacid, laxative. *Dose.*—5 to 15 grs. in pill.

Enters into.—Emp. Resin., Hyd. Oleas, Ung. Zinci, and 7 pill masses.

Official Preparations.

1. **Emplastrum Saponis.**—1 of soap in 7. White, solid. As a protective to bedsores and for strapping.

2. **Pilula Saponis Composita.**—1 gr. of opium in 5. The name is used to disguise the composition. See page 518.

SAPO MOLLIS. Soft Soap.

Source.—Soap made with potassium hydroxide and olive oil.

Characters.—Yellowish-white or green, almost inodorous, of an unctuous consistence. *Solubility.*—Readily in alcohol (90 p. c.) and 1 in 4 of water.

Enters into.—Lint. Terebinth. and the

Official Preparation.

1. **Linimentum Saponis.** *Syn.*—*Opodeldoc.*—1 in 12. A stimulant local application to sprains, bruises, and stiff joints.

Enters into.—Lint. opii.

Non-Official Preparations.

1. **Mollin.**—A soft soap containing 30 p. c. of glycerin and 17 p. c. of uncombined fat. A basis for ointments.

2. **Ether Soap.**—Soft Soap 32, Alcohol (90 p. c.) 20, methylated Ether 52. For surgical use prior to operations.

3. **Sodii Oleas.** *Syn.*—*Eunatrol.*—In cholelithiasis.

Dose.—3 to 4 grs. in pill.

4. **Liquid Glycerin Soap.**—Contains 40 p. c. of glycerin. For toilet use, and as a constituent of tooth pastes.

5. **Spiritus Saponis Alkalinus** (Hebra).—Soft Soap 4, Alcohol (90 p. c.) 2.

Pharmacology and Therapeutics.

Externally.—Hard soap is a well known **detergent**, but should not be used in any case where the skin is irritable, especially in acute or "weeping" forms of **eczema**. **Seborrhœa, scaly eczema, sycosis** and **ichthyosis** do well when the parts are washed with soft soap before any remedial agents are applied. The liniment rubbed in over **sprained** or **stiff joints** promotes the absorption of inflammatory products, but how far this effect is due to the friction or to the drug, is difficult to say. Soap plaster is a non-irritant protective to **abrasions** or **bedsores**, and strapping is very useful in **sprains, fractures, synovitis, arthritis**, &c., by affording mechanical support and pressure. Soaps can be mediciated with various drugs, such as carbolic acid, sulphur, tar, &c., in varying proportions. Mollin or super-fatted soap

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

is not irritant and may be used with success in many skin diseases and makes a good basis for ointments.

Internally.—Hard soap is **antacid**, and not being easily soluble may be used to **neutralise acid** in any part of the intestinal tract, which the soluble alkalies cannot reach. It aids the emulsification of foods in the duodenum, and restores some of the normal constituents of bile. Large doses are said to dissolve **gall stones** and to render the urine alkaline in **renal calculi.** A purified hard soap is sold for this purpose under the name of **Eunatrol.** The dose is 30 to 40 grs. per diem, in pills of 5 grs. each. It is itself a gentle **laxative**, and corrects and aids the action of certain purgatives, such as jalap and aloes. Introduced into the rectum in the form of a cone as a suppository, it purges by reflexly contracting the rectum and colon, and is very useful in **infantile constipation.** Soap and warm water make an effective enema for **constipation of adults.**

Hard soap is used in pharmacy as a corrigiens and as a basis for pills and plasters, and the soft soap as a basis for some liniments.

SAPPAN. Sappan.

(*Ind. and Col. Addendum*).

Habitat.—India and Eastern Colonies.

Source.—The heart-wood of *Cæsalpinia Sappan.*

Characters.—Hard heavy sections, or orange red chips, showing well-marked concentric rings and rays.

Official Preparation.

1. **Decoctum Sappan.**—1 in 20. **B.P. Dose.**—½ to 2 ozs.

Pharmacology and Therapeutics.

Formerly used as a dye and in the manufacture of red ink.

It contains tannin and is therefore employed in pharmacy to colour mixtures red, especially when an astringent is indicated.

SARSÆ RADIX. Sarsaparilla.

N. O. *Liliaceæ.*

Habitat.—South America, Costa Rica.

Source.—The dried root of *smilax ornata*, imported from Costa Rica, and commonly known as Jamaica Sarsaparilla.

Characters.—Long, nearly cylindrical, tough, flexible roots, greyish-brown, folded together and bound with a root of the same plant into bundles of 18 in. long, 4 or 5 in. in diameter. The root $\frac{3}{16}$ in. thick, deeply wrinkled longitudinally, with numerous rootlets. Transverse section shows reddish-brown cortex and yellowish-white wood. Odourless. Taste bitter. *Impurities.*—Inferior varieties.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Resembles.—Senega, which is twisted and keeled. Hemidesmus, which is transversely cracked.

Composition.—(1) *Smilacia*, a neutral principle resembling saponin. (2) *Volatile Oil.* (3) *Resin*, *Starch*, &c.

Incompatibles.—Alkalies, which accelerate decomposition.

Action.—Alterative, diaphoretic and diuretic.

Official Preparations.

1. **Extractum Sarsæ Liquidum.**—1 in 1. Coffee brown.
B.P. Dose.—2 to 4 drs.
2. **Liquor Sarsæ Comp. Conc.**—1 in 1. Dark brown.
B.P. Dose.—2 to 8 drs.

Pharmacology and Therapeûtics.

Internally.—The pharmacology of sarsaparilla is disputed. Some believe that it is diaphoretic, diuretic and alterative, while others say that it is quite inert. As it is always given in combination with potassium iodide and other drugs in **rheumatism, syphilis, scrofula**, &c., it is difficult to judge its virtues in those diseases. In India, it is still rockoned as a valuable alterative, and complex decoctions of sarsaparilla containing 50 to 60 ingredients are prescribed by *hakims* and *kavirajes*.

SASSAFRAS RADIX. Sassafras Root.

N. O. *Laurineæ.*

Habitat.—North America.

Source.—The dried root of *Sassafras officinale.*

Characters.—Large branched pieces, covered with bark. Bark rough greyish-brown externally; internally smooth, glistening, rusty-brown. Odour aromatic; taste aromatic, astringent. Wood, soft, light, greyish-yellow; odour and taste like bark.

Composition.—(1) *Volatile oil*, consisting of *safrol* (see below) 90 p.c. and *terpene* 10 p.c. (2) *Sassafrin.* (3) *Resin*, *Tannic acid*, &c.

Action.—Diaphoretic. A flavouring agent.

Non-Official Preparation.

1. **Safrol.**—Largely obtained from Japanese camphor oil. Externally, it acts like menthol. Internally, it is given in rheumatism and sciatica. *Dose.*—20 to 30 ms.

Pharmacology and Therapeutics.

Internally.—The pharmacology of sassafras is unknown. It is said to possess slight **stimulant** and **diaphoretic** properties, on account of its volatile oil. It is generally used in combination with sarsaparilla and other drugs, as in Liq. Sarsæ Comp. Conc., and occasionally for its flavour.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

SCAMMONIÆ RADIX.

Scammony Root. N. O. *Convolvulaceæ.*

Habitat.—Syria, Asia Minor, and some parts of India.

Source.—The dried root of *Convolvulus Scammonia.*

Characters.—Brownish-grey, tapering or cylindrical, 1 to 3 in. in diameter, contorted, longitudinally furrowed. Crown enlarged, with remains of aerial stems. Fracture fibrous. Internally, colour light or dark-grey. Odour characteristic. Taste at first sweetish, afterwards slightly acrid.

Resembles.—Belladonna root, which is shorter.

Action.—The juice of fresh root is a griping purgative.

SCAMMONIÆ RESINA. Scammony Resin.

Source.—Prepared by making a tincture from the scammony root, with alcohol (90 p.c.), and by adding water to precipitate the resin : then by washing and drying.

Characters.—Brownish translucent pieces, brittle. Fracture resinous. Odour sweet, fragrant. Does not form an emulsion with water. Soluble in alcohol and ether. *Impurities.*—Guaiacum resin which colours potato, blue. Jalapin resin, insoluble in ether.

Action.—Powerfully purgative. **B.P. Dose.**—3 to 8 grs. in pill or powder.

Enters into.—Ext. Colocynth. Co., Pil. Colocynth. Co., Pil. Colocyn. et Hyos. and the

Official Preparations.

1. **Pilula Scammonii Composita.**—1 in 3 nearly. Purgative. **B.P. Dose.**—4 to 8 grs.

2. **Pulvis Scammonii Compositus.**—1 in 2. Brown coloured. Hydragogue purgative. **B.P. Dose.**—10 to 20 grs. ; 1 to 2 grs. for an infant 1 year old.

SCAMMONIUM. Scammony.

Syn. I. V.—*Sakmunid, Sugmunid.* Hind.

Source.—A gum-resin obtained by incision from the living root of *Convolvulus Scammonia,* known in commerce as Virgin Scammony.

Characters.—Flattened or irregular cakes, dark-grey or blackish, covered with grey powder. Brittle. Fracture glossy, resinous, porous, dark-brown. Thin fragments brown, translucent. Reduced easily to ash-grey powder and emulsifies with water. Odour characteristic. Taste acrid. *Impurities.*—Starch, chalk and resin prepared from the root.

Composition.—(1) *Resin* (*oft*) 70 p.c. (2) *Scammonin,* identical with convolvulin, a glucoside. (3) *Gum.* Scammonin is found in both gum-resin and resin.

Pharmacology.

Internally. **Gastro-intestinal tract and liver.**—Scammony or scammony-resin acts like Jalap. Its action begins only

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

when it mixes with the bile in the duodenum. It is the taurocholate and glycocholate of soda of the bile, that help its activity. It powerfully stimulates the secretion of the muscular coat, though the contraction is irregular. As a result, free purgation occurs with griping in about 4 hours ; the stool being at first soft, but it soon becomes thin and watery. It is therefore a smart **hydragogue purgative**. It does not purge when injected into the blood, hence its action is entirely a local one. In large doses, it causes gastro-enteritis. It is used to complete the effect of other **vermifuges** for round and tape worms, and is a feeble **hepatic stimulant**.

Therapeutics.

Internally.—Scammony or scammony resin is rarely used alone on account of its griping qualities. By combining it with other purgatives, its own severity of action is mitigated, while the action of others is promoted. It acts promptly when given with an alkali ; soap answering well. In **severe constipation** or **impaction of fæces** the compound pill or powder can be given with advantage, care being taken that there is no gastro-intestinal irritation.

On account of its hydragogue properties, it can be given in cases, where depletion is necessary, as in **apoplexy**, or **cerebral congestion**, or where some effused fluid is to be absorbed, as in **dropsy**. Jalap answers better in such cases.

Though it is not a true **anthelmintic**, it can be used for the expulsion of intestinal worms, after a dose of santonin ; its irritant purgative properties dislodging the *parasites* from the intestinal canal.

SCILLA. Squill. N.O. *Liliaceæ*.

Habitat.—Mediterranean Coasts.

Source.—The bulb of *Urginea Scilla*, divested of its dry membranous outer scales, cut into slices and dried.

Characters.—The slices of the inner scales are curved, tapering towards both ends, yellowish-white or pinkish, 1 to 2 in. long, translucent, pulverisable when dry, not when moist, inodorous, bitter.

Composition.—Two active principles—(1) *Scillitoxin* or *scillain*, (2) *Scillipicrin*.

Official Preparations.

1. **Acetum Scillæ.**—1 in 8. Filter through talc. **B.P. Dose.**—10 to 30 ms.
2. **Oxymel Scillæ.**—1 in 15 nearly. A thick opalescent brownish liquid. **B.P. Dose.**—½ to 1 dr. as an expectorant.
3. **Pilula Scillæ Composita.**—1 in 4 nearly. **B.P. Dose.**—4 to 8 grs.
4. **Pilula Ipecacuanhæ cum Scilla.**—(see page 468.).
5. **Syrupus Scillæ.**—1 in 17 nearly. A thick straw coloured liquid.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

B.P. Dose.—½ to 1 dr. as an expectorant. 5 ms. for an infant 1 year old. *It should not be given with alkalies* as it contains acetic acid.

6. **Tinctura Scillæ.**—1 in 5. Straw coloured.

B.P. Dose.—5 to 15 ms.

PHARMACOLOGY.

Internally.—Squill acts like digitalis (*q.v.* page 379) in many respects. The description of the latter will therefore apply to that of the former, with the following distinguishing characteristics given below :—

1. Squill is a **more powerful gastro-intestinal irritant than digitalis**, causing nausea, vomiting, purging (even bloody stools), and intense inflammation of the membrane, in full doses, and occasionally symptoms of indigestion in medicinal doses. The actions are due partly to its local and partly to its remote effects, for they can be produced when the drug is applied to an abraded surface, or injected into a vein, subcutaneous tissue or serous cavity.

2. It increases the vascularity and the secretion of the bronchial mucous membrane, due probably to the excretion of the active ingredients of the drug. It is therefore a powerful **expectorant**. Digitalis has no such action.

3. Squill is a **more powerful diuretic** than digitalis. It acts in two ways.—(a) Like digitalis it raises the blood-pressure especially in the renal arteries. (b) The active ingredients being excreted by the kidneys, act as direct stimulants to the renal cells, and may cause considerable irritation of those organs.

THERAPEUTICS.

Internally.—Squill can be given in cardiac and other forms of **dropsy**, because its action closely resembles that of digitalis, but its diuretic action is considerably increased, and its irritant properties are somewhat mitigated, when it is combined with digitalis. Even then, it is safe to occasionally suspend its administration for a while. Baly's or Guy's pill (see p. 384) is an excellent combination, and an efficient diuretic in **cardiac dropsy**. It is rarely prescribed alone and is contra-indicated in acute renal disease or if there be gastro-intestinal irritation.

As an expectorant, it should not be given in acute **bronchitis**, but **exclusively in its later stages** especially when the pulse is soft and skin is moist. It also should not be used in **phthisis**, if the digestive powers are liable to be deranged. In the **chronic bronchial affections** of children, the oxymel or syrup is always serviceable in 10 to 15 m. doses, but its indiscriminate use in all varieties of bronchial affections is to be deprecated. Squill becomes doubly beneficial in **chronic catarrh** of dropsical patients.

It is never given as an emetic or purgative, though Whitla

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

recommends the syrup as an emetic in combination with ipecacuanha wine in 30 m. doses respectively, to a child one year old.

The active principles are powerful cardiac poisons.

SCOPARII CACUMINA. Broom tops.

N. O. *Leguminosæ.*

Habitat.—Great Britain.

Source.—The fresh and dried tops of *Cytisus scoparius.*

Characters.—Stem dark green, with long, straight, alternate branches, which like the stem, are winged. tough and flexible. The leaves if present are small, sessile and simple above, stalked and trifoliate below. Taste bitter and nauseous, Odour peculiar when bruised, if fresh. Odourless when dry.

Composition.—(1) *Scoparin*, a yellow crystalline neutral principle. (2) *Sparteine*, an oily, liquid, volatile alkaloid, which resembles digitalis in its action.

Action.—Diuretic.

Official Preparations.

1. **Infusum Scoparii.**—Made with *dried* tops. (1 in 10.).
B.P. Dose.—1 to 2 ozs.
2. **Succus Scoparii.**—Made with *fresh* tops. A brown juice.
B.P. Dose.—1 to 2 drs.

Non-Official Preparations.

1. **Sparteinæ Sulphas.**—Colourless crystals, soluble 3 in 2 of water. *Dose.*—¼ to 1 gr.
2. **Oxysparteina.**—An oxidation product of sparteine, in white granular crystals, very soluble, forming strongly alkaline solutions. *Dose.*—½ to 1½ grs.
3. **Oxysparteinæ Hydrochloridum.**—In transparent crystals, freely soluble in water. May be used hypodermically. *Dose.*—½ to 1½ grs. daily.

Pharmacology and Therapeutics.

Broom has no external action. As it contains two active principles scoparine and sparteine, broom is a valuable **diuretic.** Sparteine increases the force of the heart like digitalis, and has been recommended for use where digitalis is contra-indicated but it is not so certain in its action. Broom is usually prescribed with other diuretics in all forms of **dropsy**, especially cardiac and **interstitial nephritis.** Haustus Scoparii Compositus, consisting of Pot. Tartras. 20 grs., Sp. Juniperis 30 ms. and decoct. Scoparii. ad. 1 oz. is a very valuable combination, but it should never be prescribed for acute Bright's disease. Sparteine is said to be of value in cardiac failure complicating **infantile diphtheria.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

SENEGÆ RADIX. Senega root.

N. O. *Polygaleæ.*

Habitat.—North America.

Source.—The dried root of *Polygala Senega.*

Characters.—Slender roots 2 to 4 in. long, of which the upper end is an irregular knotted tuberosity with remains of small stems, tapering below into a tortuous wrinkled keeled root, ¼ to ½ in. thick. Bark yellowish or brownish grey, transversely cracked. Fracture short. Odour distinctive; taste at first sweetish, afterwards acrid causing a flow of saliva.

Resembles.—*Arnica, Valerian, Sexbentary and Green Hellebore,* but these have no keels.

Composition.—(1) *Senegin,* a glucoside, which is identical with *Saponin,* the active principle of *Quillaia bark.* It is a white powder, which forms a soapy emulsion when mixed with boiling water. It acts liks *Digitonin* (see p. 379). (2) *Polygalic acid.*

Action.—Stimulant expectorant.

Official Preparations.

1. **Infusum Senegæ.**—(1 in 20). **B.P. Dose.**—½ to 1 oz.
2. **Liquor Senegæ Concentratus.**—**B.P. Dose.**—½ to 1 dr.
3. **Tinctura Senegæ.**—Sherry coloured. 1 in 5.

B.P. Dose.—½ to 1 dr.

Pharmacology.

Externally.—Senega is an *irritant* to the skin.

Internally. **Alimentary canal.**—In large doses it *irritates* the tract, producing salivation, vomiting, and diarrhœa. Small doses cause indigestion.

Circulation.—It is slowly absorbed and senegin circulates as such in the blood. It is a **cardiac depressant,** and removes the systolic standstill produced by digitalis. It arrests the heart in diastole. It is excreted by the skin, bronchial mucous membrane, and the kidneys.

Respiration.—The powdered root, if inhaled, causes **sneezing** and cough. The action is chiefly directed to the bronchial tubes, through whose mucous membrane it is excreted. The bronchial mucous membrane is irritated by the excretion of senegin, which causes vascular dilatation, greater secretion, and reflexly, cough. Senega is therefore a **stimulating expectorant.**

Skin and kidneys.—Senega is also excreted by these organs, and stimulates their actions moderately. Therefore it is a mild **diuretic and diaphoretic.**

Therapeutics.

The chief use of senega is as a **stimulating expectorant.** As it is an irritant to the bronchial mucous membrnne, it must not be given in acute bronchitis, nor, on account of its gastro-intestinal action, when there is indigestion.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

The indications for the use of senega are when the power to expectorate is small, but the quantity of matter to be expectorated is abnormally large, and it is more or less purulent in character as in the **second stage of bronchitis** and **pneumonia in the stage of resolution.** When the expectoration is tough and scanty, this remedy is useless. It is of value in **bronchiectasis** but should *not* be prescribed for the cough of **phthisis.** Some hold that senega sets up constant coughing by stimulating the respiratory centre or the efferent nerves, and thus empties the tubes and does not allow the mucus to accumulate. Farquharson believes that it acts as a tonic to the unstriped muscles of the bronchial tubes and thus aids in the expulsion of their contents. There is no doubt that the best effects are obtained when senega is combined with ammonium carbonate. According to professor Schmiedeberg, senega is not the best member of the group of stimulating expectorants; quillaia is not only better but less nauseating and cheaper. It contains the same active principle (saponin) and in much larger proportion.

Under senega the pulsations of the heart become less frequent; it is therefore useful **when the heart is weak and dilated.** It has also been recommended to *relieve the distressing pulsations of* **aortic disease** and *counteract the effects of* **an overdose of digitalis.** As a **diuretic,** senega is weak and uncertain in its action, but it is said to be an excellent diaphoretic in **chronic rheumatism.**

It has lately been extolled as a remedy for **amenorrhœa;** for which purpose it is given in saturated decoction for two weeks before the expected period.

Senegin, in 2 gr. doses, has proved successful as a means of arresting **uterine hæmorrhage.**

Very small doses of senega (3 ms. to ½ oz.) **emulsify fats and oils,** and the tincture may be used with advantage in *making the mistura olei ricini.*

SENNA ALEXANDRINA. Alexandrian Senna.

N. O. *Leguminosæ.*

Habitat.—Egypt.

Source.—The dried leaflets of *Cassia acutifolia.*

Characters.—¾ to 1¼ in. long, ¼ to ½ in. broad, lanceolate or oval-lanceolate, acute, *unequal at the base,* entire, thin, brittle, pale greyish-green. Surface finely pubescent, with distinct veins on the under surface. Odour faint, tea-like. Taste mucilaginous, unpleasant.

Resembles.—Leaves of *Uva Ursi* and *Buchu;* all of which are equal at the base.

SENNA INDICA. East Indian Senna.

Syn. B. P.—Tinnivelly Senna.

Habitat.—Southern India.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Source.—The dried leaflets of *Cassia angustifolia.*

Characters.—Usually varying from 1 to 2 in. in length, lanceolate, acute, unequal at the base, thin, entire, yellowish-green, smooth above, somewhat duller beneath. Glabrous or slightly pubescent. Odour and taste as above.

Composition of both kinds.—(1) *Cathartic acid*, an amorphous purgative glucoside. It exists as salts of earthy bases which are soluble in water. (2) Other glucosides, *sennacrol* and *sennapicrin*, soluble in water. (3) *Chrysophanic acid.* (4) A sugar, *catharto-mannite.*

Action.—Simple purgative.

Official Preparations of either kind.

1. **Confectio Sennæ.**—**B. P. Dose.**—60 to 120 grs.
2. **Infusum Sennæ.**—(1 to 10). **P. P. Dose.**—½ to 1 oz.
3. **Liquor Sennæ Concentratus. B. P. Dose.**—½ to 1 dr.
4. **Mistura Sennæ Composita.** *Syn.*—*Black Draught.*—Contains magnesium sulphate (1 in 4). **B. P. Dose.**—1 to 2 ozs.
5. **Pulvis Glycyrrhizæ Compositus.**—Senna is the most important ingredient (2 in 12). **B. P. Dose.**—60 to 120 grs.
6. **Syrupus Sennæ.**—**B. P. Dose.**—½ to 2 drs.
7. **Tinctura Sennæ Composita.**—1 in 5. **B. P. Dose.**—½ to 1 dr. for repeated administration; 2 to 4 drs. for a single dose.

Pharmacology.

Externally.—None.

Internally.—Senna is a **laxative** or brisk **purgative** according to the dose used. The cathartic acid in it stimulates both the secretion and peristaltic action of the intestines, especially the colon, and produces pale yellow watery stools, containing some undigested food. It is not a cholagogue. Large doses cause **griping.** It possesses none of the tonic effects of rhubarb; on the other hand, purgation by senna does not cause subsequent constipation. It may however cause the urine to be red. Injected into the veins, it causes vomiting and purging. It is eliminated with all the secretions, and will purge the child when given to nursing women.

Therapeutics.

Senna is a safe purgative in slight cases of **simple constipation** and **fæcal accumulation**, but, on account of its tendency to gripe and nauseous taste, it is rarely given alone.

It is largely used *to complete the effect of duodenal purgatives*, in the form of blue pill at bed time and black draught in the morning. To make the draught agreeable Ext. Glycyrrhizæ liq. may be added to it. The compound liquorice powder is to be preferred to the black draught, as it is a very nasty mixture. This preparation is largely used in **habitual constipation** and the **constipation of pregnancy.** Confection of senna, either with or without sulphur, is a valuable laxative in **hæmorrhoidal condi-**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

tions and when coated with chocolate, forms the well-known **Tamar Indien**, which is so readily taken by children.

It is said that the infusion contains more cathartic acid than the other preparations. Combined with gentian, it is an admirable remedy for **dyspepsia with constipation.** The following was a favourite prescription of the late Dr. Abernethy—Inf. Gentian. Co. 1 oz., Inf. Sennæ 4 drs., Tinct. Cardam. Co. 1 dr.

Cathartic acid is often given and is a safe, mild purgative; rarely producing nausea or griping. It can be prescribed in combination with syrup of virginian prune, which completely disguises the taste. The dose for an adult is 5 grains.

Prescribing hints.—Infusion of senna soon decomposes; this can be prevented by the addition of 1 grain of nitre to each ounce of the infusion. The griping property of the black draught may be prevented by adding a few ms. of Tr. Cardamom. Co.

SERPENTARIÆ RHIZOMA. Serpentary Rhizome.

N. O. *Aristolochiaceæ.*

Syn.—Virginia snake root.

Habitat.—North America.

Source.—The dried rhizome and rootlets of *Aristolochia serpentaria* or of *Aristolochia reticulata.*

Characters.—Rhizome ½ in. thick, 1 in. long. The upper surface bearing remains of aerial stems; and under surface, numerous wiry interlacing roots of about 3 inches long. Dull yellowish-brown. Odour aromatic, camphoraceous with a strong aromatic bitter taste.

Resembles.—*Valerian* and *Arnica*, but can be distinguished by the smell.

Composition.—(1) A bitter principle, *Aristolochin.* (2) A volatile oil. (3) Resin.

Action.—Bitter stomachic.

Enters into.—Tinctura Cinchonæ Composita.

Official Preparations.

1. **Infusum Serpentariæ.**—1 in. 20. **B. P. Dose.**—½ to 1 oz.
2. **Liquor Serpentariæ Concentratus.**—**B.P. Dose.**—½ to 2 drs.
3. **Tinctura Serpentariæ.**—1 in 5. (Alcohol 70 p.c.).

B.P. Dose.—½ to 1 dr.

Pharmacology and Therapeutics.

It is a **bitter stomachic** and **stimulant expectorant**; also said to be a **cardiac stimulant, diaphoretic** and **diuretic.** Small doses act like other bitter tonics; large ones irritate the gastro-intestinal tract throughout its extent, with production of much flatulence. It is chiefly used, as a vehicle for other drugs, in **bronchitis** and **typhoid fever.** Said to be useful in the **amenorrhœa** of **anæmia** and **chlorosis.** Many properties are ascribed to it, but most of these are imaginary.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

It is strongly recommended by Garrod in gout, and is said to be a useful *substitute for guaiacum*, when people are unable to take that drug.

SESAMI OLEUM. Sesame oil.

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern, African and North American Colonies.

Source.—The oil expressed from the seeds of the *Sesamum Indicum*.

Characters.—A pale yellow, limpid oil; faint odour, bland taste.

Pharmacology.

Used as a *substitute for olive oil*, to make liniments, ointments and plasters.

SEVUM PRÆPARATUM.

Prepared suet. N. O. *Ruminantia.*

Source.—The internal fat of the abdomen of the sheep, *Ovis aries*, purified by melting and straining.

Characters.—Well known.

Composition.—(1) *Olein*, 30 p. c. (2) *Palmitin*. (3) *Stearin*.

Action.—(*a*) externally, emollient. (*b*) internally, nutritive.

Enters into.—Unguentum Hydrargyri.

Non-Official Preparation.

1. **Sevum Phosphoratum.**—10 p. c. Used as a concentrated fatty basis for the preparation of many of the compound phosphorus pills.

SINAPIS. Mustard.

Source.—Black and white mustard seeds powdered and mixed.

Characters.—A greenish yellow powder, with an acrid, bitter, and pungent taste; inodorous when dry, but exhaling when moist a characteristic pungent odour. *Impurities.*—Starch and flour.

Action.—Counter-irritant, emetic.

Official Preparation.

1. **Charta Sinapis.**—Mustard powder, after the *fixed* oil has been extracted with benzol, is mixed with Liquor Caoutchouc and spread on cartridge paper.

SINAPIS ALBÆ SEMINA. White Mustard seeds.

N. O. *Cruciferæ.*

Syn I. V.—*Dhóp-rái*, Beng. *Sufed-rái*, Hind.

Source.—The dried ripe seeds of *Brassica alba*.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—The seeds about $\frac{1}{10}$ in. diameter, $\frac{1}{10}$ gr. in weight. Roundish, pale yellow, very finely pitted and reticulated testa. Externally hard; internally yellow, oily. Inodorous when entire or powdered, taste pungent.

Composition.—(1) A bland fixed oil. (2) *Sinalbin* and *Myrosin*; Myrosin converts *sinalbin* into a fixed pungent body called *acrinyl isothiocyanate*, *glucose*, and *sinapin sulphate*, in presence of water.

SINAPIS NIGRÆ SEMINA. Black Mustard Seeds.

Syn. I. V.—*Rái-sarisha*, Beng. *Makra-rái*, Hind.

Source.—The dried ripe seeds of *Brassica nigra*.

Characters.—Scarcely half the size of white mustard seeds, and dark reddish or greyish brown in colour, internally yellow.

Composition.—(1) The same fixed oil. (2) *Sinigrin* and *Myrosin*. On the addition of water, the latter converts sinigrin into the official volatile oil of mustard (which is *allyl isothiocyanate*), *glucose*, and *potassium hydrogen sulphate*.

OLEUM SINAPIS VOLATILE.

Volatile oil of Mustard.

Source.—The volatile oil distilled from *black* mustard seeds after maceration with water.

Characters.—Colourless or pale yellow, intensely pungent and irritant with an acrid taste. Sp. gr. 1.018 to 1.030. *Solubility.*—1 in 50 of water, readily in spirit and in ether.

Composition.—95 p. c. of *Allyl isothiocyanate*.

Official Preparation.

1. **Linimentum Sinapis.**—Contains 4 p. c. of volatile oil. 1 in 27.

Non-Official Preparations.

1. **Spiritus Sinapis.**—Volatile oil 1, alcohol (90 p.c.) 49.
2. **Thiosinamin.** *Syn.*—*Rhodallin.*—Formed by warming oil of mustard with alcoholic solution of ammonia. Soluble in water, alcohol, and ether. Solution, 15 to 20 p.c., used hypodermically for **lupus** and **uterine affections.** Use with caution.

Pharmacology.

Externally.—Mustard is a powerful local **irritant, rubefacient,** and **vesicant.** When it is first applied, there is a sensation of **warmth,** followed by **severe burning pain,** due to the irritant action of the mustard on the sensory nerves and increased local blood-supply. This irritation is quickly followed by paralysis, as a result of which there is **loss of sensibility,** and a diminution both of the pain produced by the mustard and of any that may have existed previously. Mustard is also a **counter-irritant.** The excitation of the sensory nerves may **reflexly stimulate the cardiac and respiratory centres** and sometimes may be used to restore consciousness after fainting.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Internally. **Gastro-intestinal tract.**—Taken in small doses as a *condiment*, mustard causes a sense of warmth in the stomach, stimulates the secretion of gastric juice and peristalsis, and therefore sharpens the appetite. In larger doses, it acts as a prompt and efficient *emetic*, without causing any of the usual depression.

Therapeutics.

Internally.—A linseed poultice, having a little mustard (1 in 16) dusted over it is, a very common and efficacious *irritant* and *counter-irritant* in **rheumatism, pleurisy, pneumonia, bronchitis,** and many **febrile diseases.** (See page 484).

A pure mustard plaster, when applied to the skin, will soothe pain in **gastralgia, colic, neuralgia, lumbago,** &c. When put over the epigastrium it often **relieves vomiting,** and when applied to the calves of the legs, it is an excellent reflex stimulant in cases of **syncope, asphyxia,** and **coma.**

Severe headache, common colds, and **febrile conditions,** especially in children, are greatly relieved by a hot **pediluvium,** or foot-bath, whilst **infantile convulsions** may constantly be checked by immersion of the whole of the patient's body in a mustard bath, containing one tablespoonful of mustard to each gallon of water.

A mustard **sitz bath** (*i. e.* hip-bath) may be taken at the time of the period to induce **menstruation,** when it has been suppressed by a chill.

Internally.—As an **emetic,** mustard is specially valuable in narcotic poisoning on account of its reflex stimulant effects. Give one to four teaspoonfuls in a tumbler of warm water.

SODIUM. Sodium. Na.

Source.—The metal sodium as met with in commerce. It decomposes water and must therefore be kept under naphtha in stoppered bottles.

Characters.—Well known.

Enters into.—Liquor Sodii Ethylatis.

Non-Official Preparation.

℞ **Pasta Londinensis.**—Caustic soda and unslaked lime, equal parts. Less painful than Vienna Paste (see p. 570).

Toxicology of the Caustic Alkalies.

Persons are not often poisoned by the caustic alkalies, but accidents occasionally happen through their swallowing by mistake either *pearl ash*, which is a mixture of potassium carbonate and potash, or *soap-lees*, which contain the corresponding sodium salts.

The symptoms are a caustic taste in the mouth and burning heat in the throat, the mucous membrane of which becomes swollen, soft and red.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

This is followed by pain in the stomach, vomiting, diarrhœa, feebleness of the pulse and general collapse. On post-mortem examination, the whole mucous membrane from the mouth to the stomach is found red, swollen and excoriated.

Treatment.—Any rapidly acting emetic, or hypodermic injection of apomorphine. If no emetics available, give copious draughts of warm water and tickle back of throat with a feather. After vomiting has occurred, give (1) **feeble acids** (*e. g.* vinegar, lime-juice, dilute acetic or citric acid). (2) **demulcents** (oil, linseed tea, white of egg).

N. B.—Do not wash out the stomach with the stomach-pump, as there is danger of damaging the softened mucous membrane.

SODA TARTARATA.

Tartarated Soda. $KNaC_4H_4O_6, 4H_2O$.

Syn. B.P.—Sodium Potassium Tartrate.

Syn. Commercial.—*Rochelle Salt. Seignette's Salt.*

Source.—Add acid potassium tartrate to a hot solution of sodium carbonate, and allow to crystallise out.

Characters.—Large, colourless, transparent, crystalline prisms, with a saltish taste. *Solubility.*—1 in 2 of cold water. *Impurity.*—Acid potassium tartrate.

Action.—Diuretic, purgative.

B.P. Dose.—30 to 60 grs. (diuretic); ¼ to ½ oz. (purgative).

Official Preparation.

1. **Pulvis Sodæ Tartaratæ Effervescens.** *Syn.—Seidlitz Powder. Dose.*—Dissolve the contents of the blue paper in half a pint of water, add contents of white paper, and drink during effervescence.

SODII CITRO-TARTRAS EFFERVESCENS.

Effervescent Sodium Citro-Tartrate.

Source.—Sugar 15 ozs., Sodium Bicarbonate 51 ozs., Citric Acid 18 ozs.. Tartaric acid 27 ozs. Heat till the mixture assumes a granular form. **B.P. Dose.**—60 to 120 grs., freely diluted.

SODII SULPHAS. Sodium Sulphate.

$Na_2SO_4, 10H_2O$.

Syn.—Glauber's salts. "Sal Mirabile."

Source.—The interaction of sulphuric acid with various sodium salts.

Characters.—Colourless, transparent, efflorescent prisms, which undergo watery fusion when heated. Neutral. Taste saline. *Solubility.*—3 in 1 of cold water. *Impurities.*—Fe. and Ammon. salts.

Action.—Saline purgative, cholagogue.

B.P. Dose.—30 to 120 grs. for repeated administration, or one dose of ½ to ½ oz.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

8. **Ichthalbin.**—A combination of ichthyol and albumen. A tasteless odourless brown powder. *Dose.*—½ to 15 grs. In **eczema** and **nervous intestinal affections**, and during convalescence from fevers.

9. **Ichthargan.** *Syn.—Silver Thio-hydrocarburo-sulphonate.*—A powerfully antiseptic odourless brown powder, containing 20 p. c. of silver. Soluble in water and glycerin.

10. **Petrosulfol.**—Resembles ichthyol, but prepared from a pitch containing sulphur. For **boils, chilblains, eczema,** and **impetigo.**

11. **Thiol.**—A mixture of sulphonised hydrocarbons, prepared by heating gas-oil with sulphur. Exists in two forms (a) **thiol siccum,** a black powder, or in laminæ, (b) **thiol liquidum,** a syrupy liquid containing 40 p. c. of the latter. A substitute for ichthyol. *Dose.*—(Of dry) 2 to 10 grs.

12. **Anytin.**—Contains 33 p. c. of *Ichthyol-sulphonic acid.* Possesses the property of rendering substances like phenol readily soluble in water. These compounds are called **Anytols,** *e. g. Meta-cresol-anytol* (**Metasol**) contains 40 p. c. of meta-cresol; *Eucalyptol-anytol* (**Eucasol**) contains 12½ p. c. of eucalyptol. These solutions are used as antiseptics.

13. **Thigenol.**—A black viscid liquid. The sodium salt of an organic sulphuric acid. Contains 10 p. c. of sulphur. For skin diseases.

14. **Sphagnol.**—A decomposition product of peaty deposits. Used in blepharitis, burns etc., and as a detergent in cases of insect bites.

15. **Isarol.**—A preparation similar to Ichthyol.

16. **Tumenol.**—A Sulphonised mineral oil, in the form of a brown-mass. Used as a dusting powder in eczema, lupus, &c.

Pharmacology and Therapeutics of Sulpho-ichthyolates.

Ichthyol, which will be taken as the type, was introduced by Unna in 1882 as a remedy for chronic skin diseases: since then it has been found to possses the following virtues (1) it is an **antiseptic,** and kills most disease germs, (2) it is a **local anæsthetic,** (3) it **contracts the small vessels,** (4) it **promotes the absorption of exudations,** (5) it **increases the body-weight and improves the general health,** and (6) it **saturates the system with sulphur,** thus possessing all the good properties of that drug (which see) It is free from toxic properties, and ten times the ordinary dose may be taken without ill effects. It is valuable in all diseases where there is **capillary engorgement,** and it is reported to have given good results in **chronic rheumatism, pleural effusions, syphilis, asthma, chlorosis, scrofula, phthisis, catarrhs of the various mucous membranes,** and in various **neuralgiæ** and **uterine disorders.**

A 3 p. c injection is valuable in **gonorrhœa,** and a 30 p. c. solution is recommended for **prurigo senilis.** Externally the 30 p. c ointment, is employed for **wounds** and **burns of the first and second degree,** when it relieves pain atonce and slight burns heal rapidly. A 50 p. c. ointment gives excellent results in **erysipelas,** and the collodion may be used for the same purpose. The ointment, in varying strengths, is also useful

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

in eczema, acne, psoriasis, herpes, erythema, boils, carbuncles, ringworm and favus.

The ichthyol paste is an elegant application for acne rosacea, whilst the solution in ether and alcohol gives immediate and permanent relief in erythema nodosum. As a suppository, in combination with conium, it will be found a very soothing application in hæmorrhoids and fissure of the anus. Ichthalbin is insoluble in the stomach and only splits up in the duodenum. It is intended for internal use only. Four parts are equivalent to three of ichthyol.

Thiol siccum makes a very good dusting powder in herpes and burns. The following is an excellent formula:—thiol 1, starch 1, zinc oxide 2, talc 16. Or a solution (1 in 4), or ointment (1 in 3) may be used. Solutions of ichthargan and the various anytols are powerful antiseptics, and metasol has an energetic action on diphtheritic processes.

Prescribing hint.—The odour of ichthyol may be disguised with oil of citronella, which is itself used in Ceylon for rheumatism.

SODII TAUROCHOLAS. Sodium Taurocholate.

(*Non-off.*)

Source.—Prepared from pig's bile.
Characters.—A white amorphous powder.
Dose.—2 to 6 grains, in pill, keratin-coated.
Recommended for gouty obesity and dyspepsia.

SODII TELLURAS. Sodium Tellurate.

(*Non-off.*)

A valuable remedy for checking the night-sweats of phthisis. Should be given in doses of one third to two thirds of a grain in pill daily. Imparts the characteristic tellurium smell to the breath, and may cause diarrhœa if the lungs be extensively diseased.

SODÆ CHLORIINATÆ LIQUOR. See page 329.
SODII ARSENAS. See page 173.
SODII BENZOAS. See page. 271.
SODII BROMIDUM. See page 281.
SODII CACODYLAS. See page 173.
SODII HYPOPHOSPHIS. See page 549.
SODII IODIDUM. See page 464.
SODII SALICYLAS. See page 195.

STAPHISAGRIÆ SEMINA.

Stavesacre Seeds. N. O. *Ranunculaceæ.*

Habitat.—England.
Source.—The dried ripe seeds of *Delphinium staphisagria.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Note.—*Strophanthus hispidus* contains a glucoside, *Pseudo-strophanthin*, which differs from Strophanthin in giving a red colour with sulphuric acid, and in melting at 179° C. It is twice as active as the former.

Action.—Cardiac tonic.

Official Preparations.

1. **Extractum Strophanthi.**—Dried powdered seeds percolated first with ether, then with alcohol, again dried and diluted with milk sugar. B. P. **Dose.**—$\frac{1}{4}$ to 1 gr.

2. **Tinctura Strophanthi.**—1 in 40, made with alcohol. (70 p. c.). Percolate. B. P. **Dose.**—5 to 15 ms.

Non-Official Preparations.

1. **Ouabain.**—A crystalline glucoside, extracted from the Somali arrow-poison of East Africa. It is prepared from Ouabaio wood, *Akantherа Ouabaio*, of the same natural order as strophanthus. Colourless, rectangular lamels, slightly soluble in cold water, freely in hot. *Gives a red colour with sulphuric acid*, and resembles Strophanthin in its physiological action but is twice as poisonous and twice as rapid. Produces anæsthesia of the cornea and conjunctiva. Has been recommended in **whooping-cough**, in doses of $\frac{1}{100}$ to $\frac{1}{200}$ gr. every three hours.

2. **Strophanthin.**—Already described. *Dose.*—$\frac{1}{300}$ to $\frac{1}{100}$ gr. Only used hypodermically. Unreliable, and inferior to Tr. Strophanthi.

3. **Pilula Strophanthi.**—Containing 4 or 8 ms. of Tr. Strophanthi mixed with sugar of milk. *Dose.*—1 to 3 pills.

5. **Tabellæ Strophanthi.**—Containing 4 ms. of tincture, with a chocolate basis. *Dose.*—1 to 5 tabloids.

PHARMACOLOGY.

Externally.—Both ouabain and strophanthin cause **anæsthesia of the conjunctiva and cornea.**

Internally. **Gastro-intestinal tract.**—In small doses it is **a stomachic tonic**, and large doses may cause nausea and vomiting, but it is **less irritating than digitalis.**

Muscles.—It is **a powerful poison to all striated muscles**, which it stimulates strongly.

Heart.—Action exactly **similar to that of digitalis** (which see p. 379). It however **acts more quickly** and **does not accumulate** in the system.

Vessels.—It **does not contract the peripheral vessels** and therefore causes less rise of blood-pressure than digitalis.

Kidneys.—It is **less powerful as a diuretic** than digitalis as it causes no change in the renal vessels, and the increased secretion of urine is merely due to more powerful action of the heart.

Nervous System.—It appears to have some **sedative action on the cerebrum and medulla.**

Respiratory System.—**No effect.**

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

THERAPEUTICS.

The *Kombe arrow-poison* of the Zambezi negroes is made from strophanthus, and its physiological action was discovered by a missionary, who accidentally got some of the poison on his tooth-brush.

Introduced into medicine by Fraser as a substitute for digitalis, especially in cases of chronic interstitial nephritis with increased arterial tension. It is said to be particularly useful in mitral stenosis, but on the whole it has not come up to the expectations formed of it. It is a feeble diuretic, and therefore *digitalis should always be used when diuresis is required.*

It possesses the following advantages over digitalis :—(1) it is less likely to cause vomiting, (2) it does not accumulate in the system, (3) it acts more quickly and its effects pass off more rapidly, (4) it dose not cæuse contraction of the small arteries.

In the treatment of mitral disease *the rule is to begin with digitalis* and then change to strophanthus if the former disagrees ; and where a prolonged course of treatment is required, as in cases of failing compensation, it will be found a highly satisfactory plan to give digitalis for two months, and then strophanthus combined with Easton's syrup, for one month. It has given good results in exophthalmic goitre, and is said to be of special value in renal insufficiency, the cardiac failure of prolonged typhoid fever, and in heart-weakness of a functional nature.

STRYCHNINA. Strychnine.

See page 509.

STYRAX PRÆPARATUS.

Prepared Storax. N. O. *Hamamelaceæ.*

Habitat.—Asia minor.

Source.—A purified balsam, obtained from the trunk of *Liquidambar orientalis.*

Characters.—A semitransparent, semi-fluid, brownish-yellow balsam, having a balsamic taste and an agreeable odour.

Composition.—(1) *Styrene*, a derivative of cinnamic acid. (2) *Cinnamic acid*, which can be oxidised into benzoic acid. (3) *Styracin*, which is cinnamate of cinnamyl. (4) *Two resins.*

Identification.—Resembles Confectio Sulphuris, but distinguished by its taste and smell.

Action.—Expectorant, parasiticide. **B. P. Dose.**—5 to 20 grs.

Enters into.—Tinct. Benzoini Composita.

PHARMACOLOGY AND THERAPEUTICS.

Resembles benzion and the balsams of Peru and Tolu in its action. It is a feeble expectorant and has some tonic effect

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

ment of sulphuretted hydrogen in the bowel and its subsequent absorption into the blood. Sulphur is excreted chiefly as sulphates by the urine, and as sulphuretted hydrogen by the lungs, skin, and milk. It gives an offensive smell to the breath, and blackens silver ornaments that are worn next the skin. Seeing that sulphur exists in large quantities in the bile, some observers maintain that it is a restorative in those conditions which are marked by a deficiency of that fluid, and which are known as "*acholia*." It has no effect on albuminous waste.

THERAPEUTICS.

Externally.—Sulphur is chiefly used in the treatment of **scabies** or itch. The patient should be instructed to scrub the skin well with soap and water at bed time, then rub in the ointment and sleep in flannel garments. He may wash off the ointment when he rises in the morning. In this way, itch can be cured in a few days. When the cure is complete, the patient must be warned to change his linen, and have it thoroughly disinfected to destroy any eggs of the parasite that may remain in it. On account of the irritation caused by sulphur and its disagreeable smell, some physicians substitute storax for it in the treatment of this disease.

If scabies be **complicated by eczema and impetigo**, the best preparation to use is the Unguentum Sulfuratum P. Aust. Addend., the various constituents of which act as follows,—(1) the chalk mechanically breaks up the dead skin and opens up the burrows of the parasite, (2) the tar cures the eczema, and (3) the alkali in the soap checks the weeping from the raw surface. This ointment, accompanied by the use of the warm bath, is applied twice daily, and cures in three days.

For the cure of **acne**, a lotion, consisting of sulphur 1dr., glycerin 1 oz. in 10 ozs. of rose-water, should be substituted for the ointment which is a very unsightly application to the face. Some of the severer forms of acne, however, will only yield to the Unguentum Sulphuris Hypochloritis. As an insufflation or dusting-powder, sulphur is said to be of value in **diphtheria**, and great relief is often obtained in **rheumatism and sciatica** by rubbing the affected limbs with sulphur and then applying flannel bandages.

Internally.—Sulphur is largely used as a laxative in **hæmorrhoids and fissure of the anus**, in which case it not only acts as a purgative, but it also has a direct soothing effect on the hæmorrhoidal vessels. Equal parts of the confections of senna and sulphur is a favourite prescription. Too long use of this drug leads to dyspepsia and catarrh of the bowels. It is given in **plumbism** to prevent reabsorption of lead from the intestines. In the form of "Chelsea Pensioner" it is a favourite remedy for **chronic rheumatism and gout**. In olden days the disciples

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of Hippocrates employed it largely in the treatment of **asthma**, and many modern physicians consider it of value as a remedy for **chronic bronchitis**, for which purpose it may be given in the form of the Spanish onion, which should be well boiled and eaten at bed time. Formerly rectal injections of sulphuretted hydrogen were administered in **phthisis**, but this practice has fallen into disuse. It is beneficial in many chronic skin diseases, as **psoriasis, impetigo, eczema**, and **acne**, and it acts as a sedative to the nervous system in **many troubles of the menopause.**

Prescribing hints.—The confection even when freshly prepared, is a very nauseous compound, and, when it is old, it sets into a hard mass like plaster. The lozenge is the most elegant method of administration to better class patients, and, if for any reason the use of sugar is inadvisable, the pastils may be substituted. To children sulphur is best given in the form of the compound liquorice powder, or it may be suspended in milk, honey or marmalade.

CALX SULPHURATA. Sulphurated Lime.

See page 298.

POTASSA SULPHURATA. Sulphurated Potash.

Syn.—*Liver of Sulphur.*

Source.—By heating together sulphur and carbonate of potash.

Characters.—Solid, dull-green fragments, liver brown when freshly broken, reaction alkaline, taste acrid.

Composition.—It is a mixture of salts, chiefly potassium sulphides.

Dose.—2 to 10 grs. **Action.**—Antiparasitic, and narcotic.

Non-Official Preparation.

1. **Unguentum Potassæ Sulphuratæ.**—1 in 80, made with hard and soft paraffin.

SULPHURIS IODIUM. Sulphur Iodide. SI.

Source.—Sublimed sulphur and iodine are fused together.

Characters.—Greyish-black crystalline masses, smelling like iodine.

Solubility.—Insoluble in water, soluble 1 in 60 of glycerin.

Official Preparation.

1. **Unguentum Sulphuris Iodidi.**—1 in 25, made with Adeps Benzoata.

Dispensing hint.—Unguentum Sulphuris Iodidi must be very carefully prepared, as, unless the iodide be very finely powdered, small craggy masses will remain, which will cause severe irritation of the skin.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

THERAPEUTICS.

Externally.—It is chiefly used as an inunction for various **neuralgias**. The best results are obtained in the case of **the fifth nerve**, but it has been found of value in **severe sciatica** and **sick headaches**. Its use is generally followed by some local irritation of the skin. When it comes in contact with the nasal mucous membrane it acts as a **sternutatory** and **errhine**. It will relieve the neuralgic pain that accompanies **herpes zoster**, or **shingles**.

The amyl colloid is an elegant method of obtaining the local action of aconitine and veratrine, which is aided by the evaporation of the amyl hydride. After the collodion has formed a film, the application of a piece of warm moist spongiopilene helps the anæsthetic action of the alkaloids.

Doses of $\frac{1}{10}$ gr. twice a day do good in **neuralgia** and **nervous diseases**, and of $\frac{1}{120}$ gr., four times a day have relieved the tremors of **chornic alcoholism** and **disseminated sclerosis**: it is also recommended both internally and externally for **pruritus**, and it has been proved to be an **antipyretic**. On account however of its action upon the heart and collateral effects, *it is very rarely prescribed for internal use*, and must be given with extreme caution and in infinitesimal doses.

VIBURNUM. Black Haw.

N. O. *Caprifoliaceæ.*

(*Ind. and Col. Addendum.*)

Habitat.—India, Eastern and North American Colonies.

Source.—The dried bark of *Viburnum prunifolium.*

Characters.—In thin pieces or narrow quills, glossy purplish-brown, with scattered warts and minute black dots; when collected from old wood, covered with a greyish-brown periderm which is easily removed. Inner surface smooth, pale yellow. Fracture short. Inodorous, somewhat astringent and bitter.

Composition.—Its active principle has not yet been isolated, but it contains (1) *Viburnin*, a glucoside. (2) Valerianic, tannic, gallic, oxalic, citric, and malic acids.

Action.—Astringent, bitter nervine tonic, uterine sedative.

OFFICIAL PREPARATION.

1. **Extractum Viburni Prunifolii Liquidum.**—1 in 1 of alcohol (70 p. c.). **B.P. Dose.**—1 to 2 drs.

NON-OFFICIAL PREPARATIONS.

1. **Malto-Viburnin.**—A combination with extract of malt. *Dose.*—1 to 4 grs.

2. **Celerina.**—A speciality containing viburnum in combination with celery, coca, and kola. Recommended as a nervine tonic.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PHARMACOLOGY AND THERAPEUTICS.

Viburnum **depresses the motor functions of the cord** producing paralysis and abolition of reflexes. It **slows the heart, lowers blood-pressure** and causes death by cardiac paralysis. Large doses cause **headache, amaurosis** and **dryness of the mouth.**

It has been used as a sedative in **neurotic** and **hysterical affections,** and as an astringent in **sore throat, diarrhœa,** and **dysentery** ; but its chief value is in the treatment of obstetric diseases, for which purpose, according to Schatz, it possesses virtues owned by no other drug. It undoubtedly diminishes or checks altogether uterine contractions occurring during pregnancy and endangering its continuance, and it is therefore of use in cases of **habitual abortion,** when this does not arise from any specific cause such as syphilis or nephritis. Its action is greatly superior to that of morphine or bromide of potassium, but it may often be advantageously combined with the latter at the commencement of the treatment. The best form in which to prescribe it is a teaspoonful of the liquid extract mixed with an equal amount of alcohol twice daily. It must be given for a considerable period. In **habitual dysmenorrhœa** we must commence the administration of the drug ten or fourteen days before the period is expected. It is also given to check **menorrhagia** occurring at the menopause, and to relieve the **pains preceeding and following parturition.**

Note.—The dried leaves of an allied species, *Viburnum opulus* (The Snowball Tree), or an infusion of the dry berries are stated by Jacubovsky and Manguby to relieve **angina pectoris** ; whilst a fluid extract of the bark is extensively used in America both as an antispasmodic in **colic, hysteria,** and **dysmenorrhœa,** and as a uterine sedative in **menorrhagia** and **threatened abortion.** It goes by the name of "*Cramp Bark.*"

ZINCUM. Zinc. Zn.

Syn. I.V.—*Dastá*, Beng.

ZINCI CHLORIDUM.

Zinc Chloride. ZnCl.

Source.—By dissolving zinc in hydrochloric acid. It is then purified from lead or iron by passing chlorine through it and adding zinc carbonate.

Characters.—Colourless opaque *deliquescent* rods, or tables, powerfully caustic. *Solubility.*—Freely in alcohol, water, and ether. *Impurities.*—Iron, lead, calcium, and sulphates.

Action.—A powerful caustic (only used externally). Also antiseptic.

OFFICIAL PREPARATIONS.

1. **Liquor Zinci Chloridi.**—4 ms. equals 3 grs. of solid zinc chloride. Sp. gr. 1.53. *Note.*—On diluting this liquor with water a white

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

precipitate of *basic oxychloride* is formed which may be redissolved by adding a trace of hydrochloric acid.

Non-Official Preparations.

1. **Causticum Zinci Chloridi.** (St. John's Hosp.).—Zinc chloride 4, solution of Antimony chloride 2, Starch 1, Glycerin *q.s.*
2. **Collodium Zinci Chloridi,** 1 in 6, forms an imperfect solution.
3. **Guttæ Zinci Chloridi,** R. O. H.—0.5 in 100.
4. **Guttæ Zinci Chloridi cum Cocaina,** R. O. H.—0.5 and 2.0 in 100.
5. **Pasta Zinci Chloridi.**—Zinc chloride 16 ozs., Pulv. opii 1½ oz., Hydrochloric acid 6 drs., boiling water to 1 pint. Macerate the opium in 12 ozs. of the water for 12 hours, add the acid, and filter, dissolve the zinc chloride in the filtered liquid, and add water *q. s.* to produce 1 pint. Then, to 1 oz. of the above solution, add wheaten flour 120 grs., mix, and heat in a water-bath until of a proper consistence.
6. **Darts** or **Fleches,** spear-shaped, are also made of zinc chloride mixed with an equal weight of either oil of theobroma or gutta percha. They are intended for insertion into wounds or lancet incisions, and are used in the treatment of malignant tumours which cannot be removed by operation.

Pharmacology and Therapeutics.

It is a powerful **caustic,** distinguished by its property of **burning deeply** and not spreading sideways like caustic potash and soda. It is also painless. The paste is applied to **cancers, sloughing or unhealthy sores,** and **nævi** ; the surrounding skin being first protected by sprinkling it with plaster of Paris. Diluted it is applied to **ulcers.**

It has been used to destroy the **exposed pulp in carious teeth, warts, condylomata,** and **lupus,** whilst in recent times it has been employed as an **antiseptic in the treatment of wounds,** which are covered with a mixture of zinc chloride 5 parts, zinc oxide 50 parts, water 50 parts. This causes them to heal without suppuration.

Similarly a solution of zinc chloride 1 part in 11 of distilled water is particularly useful as an antiseptic when applied to the cut surfaces in cases of **excision of the tongue, removal of the jaw, or operations about the anus,** and **after amputations and excisions in parts affected with putrid sinuses.** Under these circumstances it renders the wound incapable of putrefaction for 2 or 3 days, even though it be exposed to septic influences. Zinc chloride will also render aseptic a wound that has become septic, and an 8 p. c. solution is more energetic than a 5 p. c. solution of carbolic acid. At the same time it is useful in **checking parenchymatous oozing** after operation.

A 1 p c. solution injected into **ranulæ and ganglions** causes the cysts to harden and does not give rise to any pain.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

The interstitial injection of a solution of zinc cholride into the tissue surrouding tubercular foci has been recommended by Lannelongue as a remedy for **tuberculosis**: It causes sclerosis and the activity of the bacilli is suspended. A similar treatment has been used, with some success, for **malignant new growths.**

A weak solution of one or two grains *in a pint* of water is strongly recommended by Ringer, who states that if this solution be injected hourly during the day at the beginning of a **gonorrhœa**, it will cure the disease in 24 to 48 hours.

An impure solution, known as **Sir W. Burnett's Disinfecting Fluid**, is a powerful deodorising solution, especially useful for disinfecting the utensils in the sick-room of fever patients; it quickly permeates or disintegrates all organic matter with which it comes in contact. The chief objection to its use is that, although it is a violent poison, it is both odourless and colourless, and it is *by the accidental drinking of this fluid that most cases of zinc-poisoning occur*. Zinc chloride is **never given internally.**

Toxicology.—The symptoms and treatment of poisoning by zinc chloride are practically the same as already described under the head of the caustic alkalies (see page 614).

ZINCI SULPHAS. Zinc Sulphate.

$ZnSO_4, 7H_2O$.

Syn. Commercial.—*White Vitriol.*

Source.—By dissolving zinc in sulphuric acid, and purifying in the same way as the chloride.

Characters.—Colourless transparent prismatic crystals, with a strong metallic styptic taste. *Impurities.*—Lead, copper, iron, arsenic.

Identification.—*Closely* resembles magnesium sulphate, but may be distinguished by metallic taste and by the fact that the crystals are not so moist as those of magnesium sulphate and consequently do not stick so closely to the sides of the bottles.

Incompatibles.—Alkalies and their carbonates, lime-water, lead acetate, silver nitrate, vegetable infusions and decoctions, and milk.

Action.—Astringent, tonic, emetic.

B. P. Dose.—1 to 3 grs. (tonic), 10 to 30 grs. (emetic).

Official Preparation.

1. **Unguentum Zinci Oleatis.**—1 in 2. With white vaseline as a basis.

Non-Official Preparations.

1. **Collyrium Adstringens Luteum. P. Austr.**—Ammonium chloride 5, zinc sulphate 12½, distilled water 2,000, dissolve and add camphor 4, dissolved in dilute spirit (sp. gr. 0.895) 200. Then add saffron 1. Digest for 24 hours and filter.

2. **Lotio Rubra.**—Zinc sulphate 2 grs., Tinct. Lavend. Co. 15 ms., Water 1 oz.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

3. **Lotio Sulphatum.**—Zinc Sulphate 30 to 40 grs., Alum 30 to 40 grs., Ferrous Sulphate 20 grs., Copper Sulphate 2 grs., Water 8 ozs. For gleet.

4. **Ophthalmic discs,** containing $\frac{1}{250}$ gr. zinc sulphate, and $\frac{1}{250}$ gr. each zinc sulphate and opium respectively.

5. **Points** of zinc sulphate, or equal parts zinc sulphate and alum or copper sulphate, are moulded for **intrauterine medication.**

6. **Antiseptin,** said to consist of zinc sulphate 85, boric acid 10, zinc iodide 2½, thymol 2½. Used as a 1 to 2 p. c. solution, 10 p. c. ointment, and as a dusting powder with talc.

ZINCI CARBONAS. Zinc Carbonate.

$ZnCO_3 (Zn_2HO)_2, H_2O.$

Syn.—*Zinc Hydroxycarbanate.*

Source.—By boiling together solutions of zinc sulphate and sodium carbonate, and drying the precipitated zinc salt.

Characters.—A white tasteless inodorous powder. *Solubility.*—It is insoluble in water; soluble with effervescence and without residue in dilute nitric acid. *Impurities.*—Sulphates, chlorides, copper.

Dose.—1 to 3 grs. (tonic); 10 to 30 grs. (emetic). Rarely used, except to make the oxide and acetate.

Non-Official Preparations.

1. **Calamina Præparata.** *Syn.—Prepared Calamine.*—Prepared by calcining native carbonate of zinc and reducing it to an impalpable powder. A pale pinkish-brown powder, without grittiness.

2. **Ceratum Calaminæ.** *Syn.—Turner's Cerate.*—Calamine and yellow wax, of each 15, olive oil 40. A useful application to **burns.**

3. **Linimentum Calaminæ.**—Calamine 20 grs., zinc oxide 15 grs., limewater 2 drs., water 2 drs., olive oil to 1 oz.

4. **Lotio Calaminæ.**—Levigated Calamine 40 grs., zinc oxide 20 grs., glycerin 20 ms., rosewater to 1 oz. Elutriate the calamine and zinc oxide by triturating them in a mortar with successive portions of the water and decanting from the siliceous matter, and add the glycerin. Used in **eczema,** and **to conceal acne spots on the face.**

5. **Unguentum Calaminæ, B. P. 1885.**—Calamine 1, Adeps Benzoata 5.

ZINCI OXIDUM. Zinc Oxide. ZnO.

Source.—Prepared by the combustion of metallic zinc, or by heating the carbonate to redness in a crucible.

Characters.—A soft, nearly white, tasteless and inodorous powder, becoming pale yellow when heated. Insoluble in water. *Impurities.*—The carbonate and its impurities.

B. P. Dose.—3 to 10 grs.

Official Preparation.

1. **Unguentum Zinci.**—3 in 20. Made with Adeps Benzoata.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

NON-OFFICIAL PREPARATIONS.

1. **Unguentum Zinci cum Acido Salicylico.**—Salicylic acid 40 grs., Zinc Ointment and Soft Paraffin of each 1 oz.

2. **Cremor Zinci.**—Zinc oxide 3, white vaseline 17, perfume *q.s.*

3. **Gelatinum Zinci.**—Gelatin 5, water 9, soak 12 hours, then heat to dissolve, and add zinc oxide 2, previously rubbed down with glycerin 4¾. For use it is melted and applied with a brush to eczematous surfaces. This **gelatin basis** may be combined with ichthyol or resorcin.

4. **Gelatina Zinci Dura.** (St. John's Hosp.)—White gelatin 4, zinc oxide 3, glycerin 5, water 9. Use 1 part less of zinc oxide if to combine with ichthyol or precipitated sulphur.

5. **Lassar's Paste for Eczema.**—Zinc oxide 24, starch 24, salicylic acid 2, vaseline 50.

6. **Pilula Zinci cum Belladonna.**—Zinc oxide 2 grs., green extract of belladonna ½ gr. *Dose.*—1 or 2 at bed-time. In **night-sweats of phthisis.**

7. **Pulvis Zinci et Amyli.**—Zinc oxide 1, starch 2.

8. **Pulvis Zinci et Hydrargyri Subchloridi.**—Zinc oxide, calomel, tannic acid, and starch, equal parts.

9, **Plaster Mulls** and **Salve Mulls** are also prepared, either alone or combined with ichthyol or red mercuric oxide.

ZINCI ACETAS. Zinc Acetate.

$Zn(C_2H_3O_2)_2, 3H_2O$.

Source.—By dissolving zinc carbonate in dilute acetic acid, boiling, and allowing the zinc acetate to crystallise out.

Characters.—Thin, translucent, colourless, crystalline plates, of a pearly lustre, and with a sharp unpleasant taste. *Impurities.*—Those of the carbonate.

Incompatibles.—The same as of the sulphate.

B. P. Dose.—1 to 2 grs. (tonic).

PHARMACOLOGY OF ZINC SULPHATE, CARBONATE, OXIDE, OLEATE, AND ACETATE.

Externally.—Their action resembles that of the lead and silver salts, *i.e.* they precipitate the albumen in the discharges and in the tissues and are therefore **astringents** and **mild hæmostatics.** On the whole however they are less powerful, and the astringent action of the carbonate and oxide is very weak.

Internally. **Gastro-intestinal tract.**—All of them have an astringent action on the mucous membranes, and in large doses, with the exception of the oxide, they act as **direct emetics;** their action being very prompt and not followed by depression.

Remote effects.—Very little is known on this point, nor do we know how zinc salts act on the blood, in which fluid they undoubtedly remain for a time, probably in the form of albuminates. They are gradually eliminated in the fæces and slightly by the kidneys. After a prolonged course of zinc salts symptoms

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

of chronic poisoning may show themselves, closely resembling those of plumbism. They are said to have a **sedative action on the nervous system**, and to be **remote astringents**: the latter however is doubtful.

In the zinc mines of Silesia the workmen suffer from obstinate catarrh of the respiratory and gastro-intestinal tracts, in consequence of inhaling the dust of zinc oxide, and this is followed by general cachexia, and occasionally by all the symptoms of tabes dorsalis. Experiments on animals have shown that another effect of the chronic toxic action of zinc is inflammation and fatty degeneration of the epithelium of the renal tubules.

Therapeutics of Zinc Sulphate, Carbonate, Oxide, Oleate, and Acetate.

Externally.—Lotio Rubra, or *red wash*, is an excellent stimulating and astringent application to all sorts of **wounds** and **ulcers**, and is used as an injection in **gonorrhœa**, **leucorrhœa**, **ulcers**, and **otitis**. The ordinary strength is 2 grs. to the ounce, but 3 grs. is a better strength for leucorrhœa, and 1 gr. for otitis. Without the addition of the compound tincture of lavender, zinc lotion (1 or 2 grs. to the ounce) is used as a collyrium in **conjunctivitis**, provided that there be no ulceration of the cornea. Where a less astringent effect is desired, the oleate, oxide or carbonate should be used in any of the various forms described above. Oxide of zinc is particularly useful for all the **skin affections of children** and the Cremor Zinci is invaluable for nursery use as a substitute for violet powder. Lassar's paste and the Unguentum Metallorum (see p. 442) are good applications for many varieties of **eczema**. Equal parts of zinc oleate, mercuric oleate, and diachylon ointment (p. 564) form an ointment which is a great improvement on the old unguentum metallorum, as it is transparent, and the progress of healing can be watched without removing the dressing. All the preparations of calamine are excellent "drying applications" for the treatment of **intertrigo** and **skin diseases**, and Turner's cerate is especially good for **burns**. The galatinum zinci often relieves obstinate **pruritus**, and the points of zinc sulphate can be used as a caustic for **uterine and other ulcers**.

Internally **Gastro-intestinal tract.**—Sulphate of zinc is an *excellent emetic in cases of poisoning*, and is occasionally used for this purpose in croup and bronchitis, but it is not a safe emetic for very young children. When however an urgent action is required, a dose of 2½ to 3 grs. may be given to a child one year old, and the dose may be repeated in 15 minutes. To a child of 5 years old as much as 10 grs. may be given followed by copious draughts of water. Small doses of the sulphate or oxide are occasionally given as **astringents in diarrhœa**.

Remote effects.—As nervous depressants, both the sulphate

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

and oxide have been given internally in **hysteria, epilepsy, whooping-cough,** and **chorea,** but it is probable that they are not of any great value in the treatment of these diseases. Oxide of zinc, in combination with belladonna, is occasionally useful for checking the **night-sweats of phthisis.**

Zinc salts are reputed to be powerful "**nervine tonics,**" whatever that may mean, and Hammond strongly recommends zinc oxide in 2 to 5 gr. doses as a remedy for **nervous headache.**

ZINCI SULPHOCARBOLAS.

Zinc sulphocarbolate.

$Zn(OH{\cdot}C_6H_4SO_3)_2, H_2O$

Source.—Obtained by heating a mixture of phenol and sulphuric acid and saturating the product with zinc oxide.

Characters.—Colourless, transparent, efflorescent crystals. *Solubility.*—1 in 2 of water, and 1 in 2.5 of alcohol (90. p.c.).

Uses.—As an injection in leucorrhœa and gonorrhœa, in strengths of 2 to 3 grs. to the ounce. Not given internally.

ZINCI VALERIANAS. Zinc Valerianate.

See page 670.

Non-Official Salts of Zinc.

1. **Zinci Boras.**—Zinc Borate. A white amorphous powder, used in the form of ointment for eczema.
2. **Zinci Bromidum.**—A white, granular, deliquescent powder, whith a sharp saline and metallic taste. *Dose.*—3 to 10 grs. in epilepsy. Not well borne.
3. **Zinci Citras.**—A basic salt, not perfectly soluble in water. Given in doses of 3 to 12 grs. for epilepsy.
4. **Zinci Cyanidum.**—An insoluble white powder, resembling digitalis in its action. Is of value in heart disease. *Dose.*—$\frac{1}{10}$ to 1 gr.
5. **Zinci et Potassii Cyanidum.**—A soluble cyanide, possessing all the properties of hydrocyanic acid in a stable form. *Dose.*—$\frac{1}{10}$ to 1 gr.
6. **Zinci Lactas.**—In white crystalline crusts. Has been much used in France as a remedy for epilepsy. *Dose.*—3 to 30 grs.
7. **Zinci Nitras.**—A caustic like the chloride, but penetrates deeper and causes less pain.
8. **Zinci Permanganas.**—As an injection in gonorrhœa (see p. 582).
9. **Zinci Sulphis.**—Used as an antiseptic.
10. **Zinci Sulpho-ichthyolas.** (See Sodium Sulpho-ichthyolate).

ZINGIBER. Ginger.

N. O. *Scitamineæ.*

Habitat.—East and West Indies

Source.—The scraped and dried rhizome of *Zingiber officinale.*

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Characters.—Flattish irregularly branched pieces about 3 to 4 in. long, each branch crowned by a depressed scar. Externally pale buff, striated fibrous. Fracture mealy, short, rather fibrous. Odour wellknown, agreeable and aromatic. Taste strong, pungent.

Identification—Resembles turmeric but is distiguished both by its taste and smell, and by the fact that it is not yellow.

Composition.—(1) An aromatic volatile oil to which the flavour is due. (2) *Gingerin* or *Gingerol.* (3) Several resins and allied bodies.

Action.—Carminative and antispasmodic.

B. P. Dose.—10 to 20 grs.

Enters into.—Infusum Sennæ, Mist. Sennæ Co., Pil. Scillæ Co., Pil. Combogiæ Co., Pulv. Cinnamomi Co., Pulv. Jalap. Co., Pulv. Opii Co., Pulv. Rhei Co., Pulv. Scammon. Co., pill. Aloes et Ferri. and the

Official Preparations.

1. **Syrupus Zingiberis.**—1 in 40. **B.P. Dose.**—½ to 1 dr.
2. **Tinctura Zingiberis.**—1 in 10. **B.P. Dose.**—30 to 60 ms.

Enters into.—Pil. Scammon. Co., Acid Sulphuric Arom., Infus. Cinchonæ Acid., Solution Sennæ Concentratus.

Pharmacology and Therapeutics.

Ginger is a powerful **aromatic stimulant,** acting like capsicum and cardamons (which see). Chewed, it is a valuable **sialagogue**; and used as snuff, it is a powerful **errhine,** but it is chiefly given as a **stomachic, carminative,** and **flavouring agent.** Commercial gingerin, which is an oleo-resin is a useful addition to purgative pills to prevent griping. The dose is ¼ to 1 grain.

PRIYA PARIJAT SEN.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PART VI.

SERUM THERAPEUTICS.

The basis of serum therapeutics is the study of the phenomena of immunity. By immunity is meant non-susceptibility to a given disease or a given organism, either under natural conditions or under conditions experimentally produced.

Immunity may be either *natural* (as the immunity of animals against cholera and typhoid fever) or it may be *acquired* either by passing through an attack of the disease or as the result of artificial inoculation, and it is the production of this artificial immunity which is the object of Serum Therapeutics.

Artificial Immunity.—This may be of two kinds to which the terms *active* and *passive* are usually applied.

Active Immunity is obtained by (*a*) injections of bacteria in an attenuated condition, or in sub-lethal doses, or (*b*) by sub-lethal doses of the products of the growth, *i. e.* of bacterial "toxins."

By repeating these injections, in gradually increasing doses, at suitable intervals, a very high degree of immunity is ultimately produced against the particular organism that has been used for the injections. It is obvious however that such a method of inoculation can only be *preventive*, as it takes a long time to develop. It can never be curative, as the immunity must be developed before the onset of the disease. Once produced however, it affords protection for a considerable time.

Passive Immunity depends upon the fact that if an animal be immunised to a very high degree by the previous method, its serum, when injected into a susceptible animal, will confer immunity upon it provided that it is introduced at the same time as infection occurs or even a short time afterwards. This method therefore can be applied as a *curative* agent, but the passive immunity thus conveyed only lasts for a short period because in this case there is no active production of "anti-bodies" in the blood.

When the serum of an animal is used in this way for the production of passive immunity in another animal it is found that its effects differ according to the original method of inoculation. If the micro-organisms themselves are used (whether living or dead), the serum is markedly bacteriolytic but it has little power of neutralising toxins: it is therefore said to be *antimicrobic*. On the otherhand, when filtered toxins are used for the original inoculation, the serum of the immunised animal has the power of neutralising the toxin and it is said to be *antitoxic*.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(A) ACTIVE IMMUNITY.

The following may be mentioned as the most important therapeutical applications of the principles of "active immunity; *i. e.* "protective inoculation."—

(1) Jennerian Vaccination against Small-Pox.
(2) Haffkine's inoculation against Cholera.
(3) Haffkine's inoculation against Plague.
(4) Wright and Semple's inoculation against Enteric Fever.
(5) Pasteur's inoculation against Hydrophobia.

(1). Jennerian Vaccination.

The term "vaccination" was originally applied by Jenner to the process of inoculation with Cow-Pox (vaccinia) as a protective against Small-Pox (Variola), but it has now been conclusively proved by Copeman that vaccinia is merely variola which has been modified by the method of "passage" through the bodies of a series of cows and we may therefore regard vaccination as an example of the production of active immunity by inoculation with the attenuated form of the disease against which we wish to confer immunity. Taking this view, it is now customary to apply the term "Vaccination" to all methods of protective inoculation, and the attenuated cultures or toxins which are used for this purpose are spoken of as *vaccines*.

(2). Anti-Cholera Inoculation (*Haffkine*).

Haffkine prepares two vaccines of different strength :—

(*a*) An *attenuated virus*, in which the virulence of the organism is diminished by passing a current of sterile air over the cultures.

(*b*) An *exalted virus*., in which the virulence is increased by passing through the peritoneum of a series of guinea pigs.

The dose of each is 1 c. c. The patient is first injected with the attenuated virus, and then after a lapse of 5 to 10 days with the exalted one.

Haffkine claims to have obtained great success by this method, but the editor's experiences do not bear out this statement. Indeed it is difficult to understand how the treatment can be expected to be efficacious seing that in cholera the vibrios are in the intestinal canal, and therefore in a way outside the tissues. They can therefore produce with impunity enormous quantities of toxin against which the bactericidal bodies in the blood have little or no neutralising power.

(3). Anti-Plague Inoculation. (Haffkine.)

This consists of a cultivation of plague bacilli in bouillon, the bacilli having been killed and the solution sterilised by heat. The dose is about 3 c. c. for an adult and 1 c. c. for a child, and only one injection is made. The results of inoculation, as attested by the Indian Plague commission, have been distinctly satisfactory

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

for, although absolute protection is not afforded, this method of treatment diminishes not only the total number of attacks amongst the inoculated but also the percentage mortality amongst those attacked. The commission made certain criticisms on the original method of manufacture of this prophylactic, and suggested :—

(*a*) The employment of a better method of standardisation, so as to ensure uniformity of dosage.

(*b*) The adoption of more efficient methods for the prevention of contamination by other organisms.

Both these recommendations have been carried out and the serum which is now issued from the Bombay Laboratory is much more uniform in its action and is free from the various disadvantages of the original preparation.

(4) Anti-Typhoid Inoculation. (*Wright and Semple.*)

This vaccine resembles Haffkine's antiplague prophylactic in that it contains dead Typhoid Bacilli and their toxins. The bacilli are grown in bouillon under strictly aseptic conditions, and standardisation is affected by ascertaining the amount that is necessary to kill a guinea pig of a given weight. The culture is then sterilised by heating for 5 minutes at 60°C., and the dose for each inoculation marked on the phial.

Two inoculations are made at the interval of ten days. The first inoculation always causes a certain amount of febrile disturbance, with headache and general aching; in some cases there is also sickness and diarrhœa. The inoculated person should therefore always remain in bed for at least 36 hours. Immediately after the first inoculation there is a fall in the bactericidal power of the patient's blood; but this is quickly followed by a positive reaction, and it is to allow of the onset of this reaction that the interval between the two inoculations has been fixed at 10 days.

The experiences of the Boer War show that in this method an important prophylactic measure has been discovered. According to Wright's statistics the case-incidence amongst the inoculated was only 2.25 per cent with a mortality of 12 per cent, against 5.75 per cent and 21 per cent respectively amongst the uninoculated.

(5) Pasteur's Treatment of Hydrophobia.

Although no bacilli have yet been isolated as the causative agents of this disease there can be little doubt that it is due to a micro-organism with a special affinity for the cellular elements of the central nervous system.

The object of the Pasteur treatment is to secure active immunity against the disease by injecting gradually increasing doses of the Rabies poison into the patient during the long interval that usually intervenes between the bite of the rabid animal and the development of symptoms of Hydrophobia. The passive immu-

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

nity can be secured during the incubation period, the treatment will fail. It is useless when once the symptoms have developed; no time therefore should be lost in sending off a patient to a Pasteur Institute.

Pasteur's method is to secure a poison of fixed strength by passing it through a series of rabbits. In this way he secures a virus which is much stronger than that of the dog, and which will kill a rabbit with paralytic rabies in 10 days. This he calls his "*Virus fixe.*" The spinal cords of rabbits which have died as the result of inoculation with "*Virus fixe*" are then dried in glass vessels over caustic potash, in darkrooms at a temperature of 60° F., when it is found that the virulence of the cords steadily diminishes in proportion to the time that they have been exposed to this process of dessication.

Vaccination is commenced with a cord that has been drying for 14 days, a piece of cord 1 centimetre in length being made into an emulsion with sterile salt solution and injected into the flank of the patient. The same evening an injection of a 13 day cord is made; on the following day there are injections of 12 and 11 day cords, and so on until the patient finally receives an injection from a 1 day cord. No ill effects follow this treatment and there is very little local discomfort or reaction after the injections.

According to the statistics of the Institut Pasteur the mortality amongst those bitten by rabid animals has been reduced by this method of protective vaccination from 10 per cent. to 0·48 per cent.

(B) PASSIVE IMMUNITY.

Under this head come the various methods by which we endeavour to cure a patient of a given disease by injecting him with the blood serum of an animal which has attained a high degree of active immunity either against the organism which is the cause of the particular disease or against the toxins of the organism, and we have already seen that the sera which we use for this purpose may be divided into 2 groups:—

(*a*) Antitoxic Sera, which neutralise toxins.
(*b*) Antimicrobic Sera, which kill the bacteria.

(a) Antitoxic Sera:—

The three best examples of antitoxic sera are Diphtheria Antitoxin, Tetanus Antitoxin, and Calmette's Antivenene. Before describing these in detail it is necessary to explain how an antitoxic serum is prepared. The steps in the process are as follows:—

(1) The preparation of a powerful toxin.
(2) The estimation of the power of the toxin.
(3) The development of antitoxin in the blood of a suitable animal.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

(4) The estimation of the antitoxic power of the serum of the animal thus treated.

It is not necessary to go into the details of the manufacture of the toxin. All that need be explained here is that the power of the toxin is estimated by finding out what is the smallest amount that will with certainty cause the death of a guinea pig of 250 grms. within four days. This is called "*minimum lethal dose*" or M L.D.

A large animal (generally a horse) is then gradually immunised by the injection of increasing doses of this toxin, and when a high degree of immunity has been attained the antitoxic power of the animal's serum is estimated by testing the effect of various quantities against a certain amount of toxin.

That amount of serum which will neutralise 100 times the minimum lethal dose is called an "*immunity unit*," and a "normal" antitoxic serum is one of which 1 c. c. contanis one immunity unit.

The following points should be borne in mind with reference to the use of antitoxic sera generally.—(1) In all cases the serum ought to be injected as early in the disease as possible, and in large doses. Even very large doses are without harmful effects beyond the occasional production of urticarial and erythematous eruptions. (2) Where large doses of serum are necessary, injections must be made at different parts of the body; not more than 20 c. c. should be injected at one place.

Antidiphtheritic Serum.—The ordinary strength of this serum is such that 10 c c. contains 2000 units. The dose which was originally recommended was 1500 units, but now-a-days it is the custom to begin with 4000 units and if necessary to repeat the dose in a few hours time. If there is any objection to using such a large quantity as 20 c. c., then Behring's serum should be selected which contains 3000 units in 5-6 c. c. The serum should always be administered as early as possible: indeed it is of very little use unless it is injected within the first 48 hours of the disease. For this reason in all cases of suspected diphtheria it is well to inject the antitoxin *at once* without waiting for a bacteriological report; even if the case be not one of diphtheria no harm can result from so doing. Another point to remember is that diphtheria is a much more fatal disease in children than in adults, and that children therefore require if anything larger doses of antitoxin than adults. Do not make the mistake of reducing the dose of antitoxin in proportion to the age of the patient.

The proper place for injection is in the flank or between the shoulder blades.

Antitetanic Serum.—In estimating the strength of this serum a different unit is used to that already described. This is called the "Roux unit" and represents the amount that will protect

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

1 grm. of body-weight of a given animal from the minimum lethal dose. The strength of a good antitoxic serum should be such that 1 c. c. contains at least 1.000,000 such units, *i.e*,—1 c. c. should protect 1,000,000 grms. of guinea pig against the minimum lethal dose. If antitetanic serum is to be of any use it must be administered without a moment's delay where there is any suspicion of tetanus and not less than 100 c. c. of such a serum should be injected within 24 hours in 5 doses of 20 c. c., each at a different part of the body, and this followed up by further injections if no improvement takes place. It is stated that better results have been obtained by intravenous injection and that large amounts can be safely used in this way. The serum has also been introduced intracerebrally and subdurally and cases of recovery are reported. Although this serum has not given very good results when used after the symptoms of tetanus have developed, there can be no doubt of its value as a prophylactic. Tetanus has an incubation period of about a month and many a life may be saved by the use of this serum in all cases of contused and lacerated wounds especially in a city like Calcutta where tetanus is such a scourge. The prophylactic use of this serum is now a routine treatment in the Calcutta Medical College Hospital.

Antivenene.—Calmette's original preparation consists of the serum of a horse which has been immunised against the poison of the cobra. According to him the venom of all snakes is of a similar nature and he recommends this preparation as an antidote for the bites of either the colubrine or viperine varieties. Each cubic centimetre of this serum contains 20,000 Roux units of immunity, and the ordinary dose is stated to be 10 c c. The serum however ought to be perfectly fresh and the injection requires to be made at once or within an hour of the bite.

There has been considerable controversy both as regards the universal applicability of this serum in all kinds of snake-bite and as regards the dosage.

Lamb estimates the necessary dose at 40 c.c. on the assumption that a cobra ejects 30-45 milligrammes of poison, but Rogers, who agrees with the original observations of Cunningham finds that the average amount of poison ejected by a healthy cobra is 254 milligrammes.

If this estimate be correct, then the proper dose of the serum must be 400 c.c. Moreover if it is to be of any use it must be injected intravenously, as when administered subcutaneously it is absorbed more slowly than the snake poison.

It appears also that there is a difference in the action of the poison of the Colubrine and Viperine snakes, and that an Antivenene prepared by immunisation against the poison of the former will not act as an antidote in the case of a bite by one of the latter. For this reason the Antivenene which is now sent out from the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Pasteur Institute at Kasauli is a mixture of Anticolubrine and Antiviperine Sera. It is made by immunising two horses separately and then mixing the sera. The object of this is to give the patient the best chance of recovery in the event of there being any uncertainty as to the particular class of snake by which he has been bitten. Now if Rogers' estimate is correct, it follows that 800 c.c. of this serum must be injected intravenously to ensure success in a case of cobra-bite. This almost places Antivenene outside the range of Practical Therapeutics.

Moreover Lamb has shown that antiviperine serum made by using the venom of Daboia (Russell's Viper) has no antidotal effect against the venom of other vipers, so that antiviperine serum, to be effective, must be made by using the venom of the particular viper by which the patient has been bitten.

For this reason one cannot regard either Calmette's colubrine Antivenene or the polyvalent serum of Kasauli as a specific against snake-bite. Possibly the chief value of either preparation is to neutralise any poison that may have been absorbed into the system before steps can be taken to check absorption by means of the elastic ligature and to destroy the poison at the site by the application of Potassium Permanganate according to the method devised by Sir Lauder Brunton. Antivenene therefore can only be considered to be a valuable adjuvant to the local treatment of the bite.

(*b*) **Antimicrobic Sera :—**

In the preparation of these sera the immunisation has been carried out by the injection of the living or dead bacteria which are the cause of the disease against which it is wished to secure protection. They are therefore not merely antitoxic ; they are actively bactericidal. In addition to this there is one very important difference between antitoxic and antimicrobic sera.

This difference is that whereas in antitoxic sera the actual substance which neutralises the toxin is of the nature of a chemical antidote, the bactericidal effects of the antimicrobic sera require the presence of two destinct substances, which are called the "*immune body*" and the "*complement.*" The immune body is only developed in the serum *after* the injection of bacteria, but once developed it is fairly stable. The complement on the other hand is present in normal serum in small quantity, but it is easily destroyed by heat and it rapidly disappears from the serum after withdrawal from the body. The complement appears to be the nature of a ferment and it is probable that it is the actual bactericidal agent, whilst the immune body is merely the connecting link between it and the bacterium upon which it acts.

Be that as it may, there can be no doubt of the following facts :—

1. In order that an antimicrobic serum may be of any use,

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the presence of both "immune body" and "complement" is necessary.

2. "Complement" rapidly disappears from the serum after it has been withdrawn from the body.

3. The "complement" which exists naturally in human blood serum does not appear to act in conjunction with the "immune body" contained in the serum of the horse.

The practical result of all this is that antimicrobic sera must always be fresh. Old serum is absolutely useless.

Antistreptococcic Serum.—This is an antimicrobic serum prepared by injecting cultures of streptococci into a horse. It is used chiefly in the treatment of **septicæmia, puerperal fever, erysipelas,** and **infective endocarditis,** but the results have not been very satisfactory on the whole.

This failure to obtain good results has been attributed to three causes :—

1. The "complement" rapidly disappears from the serum, which is therefore of little value unless it is perfectly fresh.

2. There is reason to believe that under the generic name of *Streptococcus Pyogenes* are included several different "Strains" of bacilli, which although they resemble one another in appearance show marked differences in their chemical reactions. For this reason it is usual nowadays to immunise the horse with as many different strains of streptococcus as possible and so to produce what is known as "*Polyvalent*" serum.

3. Infective Endocarditis may be due to the invasion of other organisms, such as the pneumococcus or staphylococcus. In this case an antistreptococcic serum is not likely to be of any use.

If therefore success is to follow treatment by antistreptococcic serum, the following rules must be observed :—

1. Always make a preliminary blood-culture to satisfy yourself that the infecting agent is really a streptococcus.

2. Always use a "polyvalent" serum.

3. See that the serum is fresh ; otherwise the "complement" will have disappeared. Serum that is more than six months old is absolutely useless.

4. The serum must be administered by hypodermic injection : it is useless to give it by the mouth or rectum.

5. Large doses are necessary ; not less than 30 c.c. per diem, and it must be continued for some time.

6. If no benefit be evident within 4 days, try another brand of serum, as the one you are using may not contain the particular "strain" you require.

In addition to the ordinary "polyvalent" serum Messrs. Burroughs and Wellcome prepare the following :—

1. *Antistreptococcus Serum, Erysipelas.*—Prepared by im-

CC-0. Mumukshu Bhawan Varanasi Collection. Digitized by eGangotri

munisation of horses with culture obtained from typical cases of erysipelas.

2. *Antistreptococcus Serum, Puerperal Fever.*—Prepared in a similar manner with cultures from 26 severe cases (some fatal) of Puerperal Fever.

3. *Antistreptococcus Serum, Scarlet Fever.*—Prepared by using cultures of streptococci, obtained from cases of Scarlet Fever.

4. *Antistreptococcus Serum, Rheumatic Fever.*—Prepared by using cultures obtained from severe cases of Acute Rheumatism and Rheumatoid Arthritis.

5. *Antistreptococcus Serum, Pyogenes.*—Prepared by using cultures from various strains of *Streptococcus Pyogenes.*

Only two of the above requir· any special mention, namely the Rheumatic and the Scarlet Fever varieties.

As regards the former, Menzer, who holds that rheumatic fever is a streptococcic infection arising from absorption in the upper air passages, has for several years treated this disease by injections of a polyvalent serum, and he claims that though this is slower than the salicylate method, the final results are much more satisfactory especially as regards endocarditis and the liability to relapses. The first effect of the serum is to cause increase of the local manifestations and the effusions into the joints. It is therefore absolutely contra-indicated if there be already any stenosis of the mitral valve, or pericardial or pleural effusions.

The ordinary dose of the serum in acute cases is 5 c.c., and the injection should be made in the vicinity of the joint chiefly affected.

In chronic cases a dose of 5 c. c. is injected every second or third day until 30 c.c. have been given, when a pause of one or more weeks is made, and then the injections are recommenced. In a considerable number of cases there is marked local reaction after the injection, as shown by œdema and redness of the skin, and not infrequently great prostration follows the use of the serum. The general consensus of opinion is therefore that that it should only be used in subacute and chronic cases, and that it should only be resorted to in acute cases after the failure of the ordinary methods of treatment.

The treatment of scarlet fever by antistreptococcus serum was introduced by Moser of Vienna, who claims that all children treated by him within 3 days of infection recovered. The minimum dose injected at one time is 100 c c. and the maximum is 200 c. c. It may be necessary to give a second injection within 24 hours, but if these two doses have no effect on the temperature, continuation of the serum is not likely to be of any value. As in diphtheria it is essential that the serum should be given early: the longer the disease has lasted, the less likelihood is there of beneficial effect.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Palmuski and Zebranski have recently prepared a specific antiscarlatinal serum by using the Streptococcus Conglomeratus, which they agree with Klein in believing to be the specific microbe in this disease. Their serum has been tried in over 1000 cases, in all of which the beneficial effect was marked, and it seemed to exert a very favourable influence on **scarlatinal nephritis** which was much less common in cases treated by this method.

N.B.—On account of the property possessed by these sera of causing bacteriolysis they are sometimes called "Streptolytic."

Antipneumococcic Serum.—This is a similar serum prepared by immunisation of a horse with various strains of *pneumococcus*. It should always be polyvalent, and the same general rules apply as given under the head of antistreptococcic serum. It has been used in **pneumonia**, and in the pneumococcal varieties of **Infective Endocarditis** and **Meningitis**, but the results have not been very satisfactory as every patient appears to breed his own special strain of germs.

Antistaphylococcic Serum.—This is a polyvalent serum prepared by immunisation with various strains of *Staphylococcus aureus: albus*, *citreus* and *hæmorrhagicus*.

It may be used in all forms of **pyæmic infection**, but specially in those cases of **infective endocarditis** in which a blood culture shows that the infective organism is a staphylococcus.

Antigonococcic Serum and **Antimeningococcus Serum**, are also prepared, but they are of doubtful value. The former is used in all forms of secondary gonorrhœal infection, and the latter in cerebro-spinal meningitis.

Sclavo's Serum for Anthrax.—This is antimicrobic serum prepared by immunisation of a horse against *Bacillus Anthracis*. Excellent results have been reported from its use.

The dose of the serum recommended in ordinary cases is 30 to 40 c.c. subdivided into three or four injections subcutaneously into different parts of the abdomen, and followed in 24 hours, if necessary, by furthur injections of from 20 to 30 c. c. In grave cases the injection should be intravenous, preferably into one of the superficial veins on the back of the hand. The dose in this case should be 10 c. c. followed in an hour or two, where there is no improvement, by another similar dose.

In an ordinary case of malignant pustule, such as is seen in those dealing with hides, if seen at an early stage a single injection may be sufficient to effect a complete cure with very little loss of substance.

Shiga's Antidysenteric Serum.—This is a polyvalent serum prepared by immunising a horse against various strains of *B. Dysentericus*. It is claimed by Shiga that by its use he has reduced the mortality from Bacillary Dysentery in Japan from

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

35 per cent to 9 per cent, but the experience of other observers does not support this statement. It is important always to use polyvalent serum as it is now certain that there are a large number of strains of this bacillus, and it appears that a serum made from a bacillus of an "acid type" is not curative for disease caused by an "alkaline type" bacillus, and *vice versa*. The dose is 20 c. c. If it is to be of any use, it must be used very early in the case, preferably in the first nine days of the illness.

Yersin's Antiplague Serum.—This is a curative antimicrobic serum, prepared by immunisation of a horse against *B. Pestis* in the usual manner. It must not be confounded with Haffkine's prophylactic vaccine. It requires to be used in very large doses, not less than 50 c.c., and it is recommended that in acute cases it should be administered intravenously. This method of treatment was reported to be very successful in China, but it proved a failure in Bombay, and the writer after an extended trial of it in Calcutta has not been able to convince himself that it in any way improves the patient's changes of recovery. All that it appears to do is to reduce the initial tendency to hyperpyrexia.

Pollantin.—This is a hay-fever specific, prepared by Dunbar by immunising horses with irritant toxins obtained from the pollen of grasses. The serum is obtainable in two forms, a fluid preserved with ·25 per cent carbolic acid, and a dried powder diluted with sugar of milk. The name "Pollantin' is properly only applied to the fluid serum. This preserves its power for many months provided that it is not exposed to the action of the air, but it is readily contaminated by growths and should therefore never be used for more than a week after the bottle has been opened. The method of administration is to instil a drop or two into the outer margin of the eye whilst the lower lid is pulled down with the finger. It then quickly checks the suffusion of the eyes, the sneezing and the general discomfort. For the nose, the best form is the powder which may be used as a snuff. Sometimes relief is obtained by the powder even when the fluid fails to act. Pollantin is best used as a prophylactic or else very early in the attack ; during a severe attack the serum has very little chance as it is quickly swept away by the tears. It should be applied both to the eyes and nose every morning before rising, and should any irritation come on during the day, the application may be repeated. The subcutaneous use of the serum is not advisable, as it is apt to cause local irritation and erythematous or urticarial rashes. The local use of the serum causes no ill-effects and does not lead to the formation of a habit.

The results of this treatment are highly satisfactory and encouraging, the latest figures showing 60% of complete cures, 29% relieved, and only 11% of failures.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

Three other preparations remain for consideration.

They are :—

1. Koch's Tuberculin TR.
2. Coley's Fluid for Sarcoma.
3. Wright's Staphylococcic Vaccine.

These have been kept to the last because their action is not quite so simple as that of either the ordinary protective "vaccines" or the curative "anti-sera."

Their effects depend upon one or the other of the following factors :—

(*a*) Increase of "opsonic effect" in the blood serum of the patient

(*b*) Variations in the virulence of micro-organisms as the result of symbiosis.

Each of these requires a few words of explanation.

(*a*) *Increase of "opsonic effect."*

By this is meant a marked increase in the phagocytic power of the white blood corpuscles due to the development in the blood-serum of a peculiar substance which modifies the bacteria in such a way as to render them an easy prey to the leucocytes.

Wright calls this "opsonic effect" and he uses the term "opsonins" to indicate the elements in the blood fluids which produce this effect, he also points out that this is something quite different from the ordinary agglutinating and bacteriolytic action of the serum, and that, whereas in healthy persons there is very little variation in the opsonic power of the blood-serum, in diseased conditions the activity of the serum may be either greater or less than normal, this variation being specially marked in cases where there is an actual septicæmia or bacterial invasion of the blood. He therefore concludes that in health there are opsonins present in the blood and that under the stimulation of bacterial invasion the opsonins are at first diminished ("negative phase") and then increased ("positive phase").

In order to ascertain through which of these phases the patient is passing it is necessary to estimate the "opsonic index" of his blood. This is done by ascertaining the average number of bacteria taken up by each polynuclear leucocyte of the patient's blood and comparing this with the average number taken up by each leucocyte of the blood of a healthy individual. Thus if there be an average of 3 bacilli in each leucocyte of the blood under examination and 5 in each leucocyte of normal blood, then the "opsonic index" is $\frac{3}{5}$ or ·6, which shows that the patient is passing through the negative phase.

Tuberculin T.R.—Koch's original tuberculin which was introduced for the cure of phthisis proved a failure and its use had almost been abandoned except in the treatmen of lupus and surgical tuberculous diseases. This method

CC-0. Panjab University Chandigarh. Digitized by eGangotri

of treatment has however received a new lease of life in consequence of the production of improved Tuberculin T. R. and of the application of Wright's method of estimation of the opsonic index to the determination of suitable cases and suitable dosage.

Tuberculin T R. is an emulsion of dead tubercle bacilli. It is an opalescent liquid containing 10 milligrammes of solid substance in each c.c. It may be diluted with a 20 per cent solution of glycerin.

It is found that injection of small doses of Tuberculin T. R. causes first a temporary fall in the opsonic index lasting from a few hours to as much as 14 days, and that this fall is followed by a prolonged rise. This action is presumably exactly the same as that caused by the absorption of the products of bacterial activity in the course of phthisis, the characteristic feature of which is that in the early stages you find periods of activity alternating with periods of quiscence, these alterations being associated with corresponding variations in the opsonic index, but that later on when the disease becomes chronic the opsonic index remains steadily increased or decreased according to the presence or absence of a response by the tissues to the stimulus caused by the bacterial toxins.

As regards the practical application of the estimation of the opsonic index to the method of treatment of phthisis by Tuberculin T. R., the following may be taken as representing the present trend of opinion of those who have tested its value :—

1. Tuberculin should be employed in *small doses*, beginning with $\frac{1}{1000}$ mgrm. and not exceeding $\frac{1}{600}$ mgrm. Large doses tend to produce a marked negative phase with a less marked positive phase in the opsonic index, whilst small doses give a slight negative and a marked positive phase.

2. Tuberculin *should not be used in acute cases or in the active stage of the disease* : otherwise the negative phase due to the tuberculin may intensify that which has already been produced by the living bacteria and may cause a serious lowering of the patient's power of resistance.

3. The dose *should not be repeated till the positive phase is well established*, as a second dose during the negative phase lowers the power of resistance of the body.

4. The *most suitable cases* are *those in which the disease is chronic* and in which *the opsonic index is found to be low*, but if the use of the serum is found to produce no marked increase in the opsonic index, which shows the tissues have lost the power of response, the treatment should not be persevered with.

5. Excellent results have been obtained in **lupus** and in **surgical tubercular affections** ; especially of the joints and glands.

6. *The treatment* should, as a rule, *only be carried out when it is possible to test the opsonic index frequently*, but it is possible

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

that in chronic cases the treatment may be safely carried out without this precaution, provided that only a small dose is used and that the dose is not repeated within a fortnight. It should not be injected every second day, as is recommended in the directions issued by Koch.

7. The *opsonic index* must *always be determined after a period of rest*; otherwise the results may be misleading.

From the above it is obvious that the tuberculous treatment is not capable of universal application and it is probable that its use will be confined to Sanatoria and similar institutions where there is a proper bacteriological equipment: even then it must be considered as only an adjunct to other lines of treatment.

Moreover there is always the possibility that the production of the negative phase may be attended by a slight risk of lowering the tissue resistance in latent cases to such an extent as to cause a lighting up of the disease and possible extension of infection to other organs. The risk however is practically negligible if the precautions noted above are observed.

(*b*) *Variations in Virulence.*

It is a well-established fact that the virulence of a given micro-organism may be either exalted or attenuated by the method of symbiosis, *i.e.*, by growing it in conjunction with another micro-organism. Also that the growth of one micro-organism may completely inhibit the growth of another. This is the principle underlying Coley's method of treatment for inoperable Sarcoma.

Coley's Fluid.—Coley having observed that a malignant sarcoma of the neck entirely disappeared after several attacks of erysipelas, endeavoured in the first instance to cure sarcomas by injecting patients with living cultures of the Erysipelas Streptococcus, but he quickly found that this method has two great drawbacks, firstly that it is very difficult to produce erysipelas at will, and secondly that once produced it is very difficult to control it. He also discovered that the curative effects of erysipelas were largely due to the toxic principles of the streptococcus which might be utilised without the production of erysipelas. His next step was the discovery of the fact that the action of the streptococcus of erysipelas can be greatly intensified by using the combined toxins of Bacillus Prodigiosus and the Streptococcus. Coley's fluid, as now used, is prepared by cultivating the streptococcus from a fatal case of erysipelas in bouillon for three weeks in the incubator. The bouillon is then sown with bacillus prodigiosus and allowed to grow at room temperature in the day light for 10 days more. The culture is then killed by heating it to 60°C in a water bath for one hour; and a few c.c. of glycerin and a little thymol are added as a preservative.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

The following are the rules for its administration.—

1. It may be used in all varieties of **sarcoma** : its action is most marked in spindle celled and least of all in melanotic sarcomata

2. It may be used for three distinct purposes (*a*) where the tumour cannot be removed, (*b*) to prevent recurrence of the tumour after operation, (*c*) to render amputation unnecessary.

3. Always begin with the minimum dose, for the reason that individual susceptibility varies greatly.

4. For local injections the dose should be much smaller than for interstitial injection remote from the tumour. The initial dose for injections into the tumour should be ¼ to ½ minim ; for injections remote from the tumour 1 minim.

5. The dose should be gradually increased until you obtain a chill and febrile reaction

6. If the injections cause depression following the reaction, the injections should only be given every other day, but daily injections increase the chances of success.

7. If the tumour becomes soft and fluctuating, open the softened areas, establish drainage and treat by ordinary aseptic principles.

8. A good tonic should be given during treatment and great attention paid to keeping the bowels free.

9. In successful cases a marked improvement is usually noted in from one to four weeks. If no improvement has occured within this period, the treatment should be discontinued. If however there is decided improvement, the injections should be continued until the tumour has totally or nearly disappeared. In some of Coley's cases the treatment was continued for more than a year, but the average duration is about two or three months.

10. Use an ordinary hypodermic syringe, and when injecting doses of less than 1 minim, dilute the toxin with water that has been sterilised by boiling.

11. When using Coley's fluid as a prophylactic smaller doses may be given and it is not advisable to push them to the point of producing a chill

There can be no doubt that this treatment affords the only hope of life in cases of **inoperable sarcoma** and it should therefore always be given a trial.

Wright's Staphylococcic Vaccine.—This is prepared by growing staphylococci upon agar and then making an emulsion with sterilised salt solution and finally killing the microbe by heating the emulsion to 60°C in the usual manner. The growth should be standardised by estimating the number of cocci ; and one dose, which is usually ½ to 1 c. c., should contain from 1000 to 2500 millions of staphylococci.

This vaccine has proved useful in various *chronic* forms of

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

staphylococcal infection, such as **acne, furunculosis** and **sycosis**, and this is especially the case where the cultures have been made from the particular strain of micro-organism which has acclimatised itself to grow in the patient's body.

The injections of the vaccine, as in the case of tuberculin are followed by a negative phase, during which the resisting power of the patient is lowered. Then comes the positive phase with a marked rise in the opsonic index, and lastly a comparatively durable period of increased resistance.

There is very slight constitutional disturbance, and after the negative phase has passed off, the initial dose of $\frac{1}{2}$ to 1 c. c. may safely be doubled.

Rogers, acting upon the well-known clinical fact that cases of cachexial fever frequently improve after a staphylococcal infection, has prepared a special staphylococcal vaccine from a strain of staphylococcus isolated from a case of cancrum oris, and is using this in the treatment of cases where the Leishman-Donovan body has been found.

His initial dose is 2 c. c. so as to get a definite temperature reaction and local swelling for two days. He states that as the result of this treatment there is first of all a marked increase of the leucocytes and that this is followed by diminution of the fever and often by a decrease in the size of the spleen.

PRIYA PARIJAT SEN.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

PART VII.

ORGANO-THERAPY.

Just as the study of the phenomena of immunity forms the basis of Serum Therapeutics, so a knowledge of the theory of internal secretion is essential for the proper application of the principles of Organo-Therapy.

Experimental physiology and clinical and therapeutical observations have demonstrated that the so called "ductless glands," viz. the thyroid, the pituitary body and the adrenals, produce from material brought by the blood substances that are essential to health and life. These substances are passed into the lymphatics and blood vessels and are therefore called "*internal secretions*" to distinguish them from the ordinary external secretions which are poured out in epithelial surfaces communicating directly or indirectly with the outside of the body.

There is also evidence to show that certain of the glands with ordinary external secretions also elaborate an internal secretion. They are the pancreas, the kidney, the testicle, the ovary and possibly the liver.

It is now beyond doubt that premature atrophy or the onset of morbid changes in the above mentioned glands may cause serious diseases by interference with the function of internal secretion, and this interference may manifest itself in one or more of three ways :—

(*a*) by diminution of secretion.
(*b*) by excessive secretion.
(*c*) by abnormality of secretion.

The object of organo-therapy therefore is two fold, *viz* :— Either to supply an internal secretion that is wanting or else to neutralise a secretion which is in excess or contains abnormal constituents.

Within the last few years an enormous number of animal extracts have been placed upon the market but the majority of these are still upon their trial. Those which have established a firm reputation in the field of therapeutics are the extracts of the thyroid gland and the adrenals ; to which may be added bone marrow and the acid extract of duodenal mucous membrane. With reference to the numerous preparations of other organs the student is advised to withhold his judgment pending further developments and not to imagine that twentieth century therapeutics consist in prescribing dried fragments of various internal organs for all the ills the flesh is heir to. There is nothing new in organo-therapy ; it has existed from time immemorial, and the

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

physician who blindly prescribes organic extracts without having a clear idea of what he is aiming at is reverting to mediæval methods as exemplified by the "eye of newt and toe of frog" and all the other appetising constituents of the celebrated "hell-broth" of the witches in Macbeth.

The Thyroid Gland.

There are two classes of disease associated with abnormality of the thyroid gland :—

1. Those in which there is an absence of internal secretion.
2. Those in which the internal secretion is either abnormal or excessive.

1. Under this head are included **myxœdema** and **cretinism** **arterio sclerosis**, **obesity** and some forms of **premature senility**. The treatment of these by means of thyroid extract has been fully dealt with in Part V. (see page 655) and no further remarks are necessary.

2. Under this head is **exophthalmic goitre**, or **Grave's disease**. Numerous methods have been devised with the object of neutralising the excessive and abnormal secretion, to which the unpleasant symptoms of the disease are believed to be due.

The chief of these are the following :—

1. The use of Thymus Extract.
2. " " " milk of thyroidectomised goat.
3. " " " the serum of thyroidectomised sheep.
4. " " " thyrolytic serum.

1. Thymus Extract

The rationale of this treatment is that there is frequently persistent enlargement of the thymus gland in **exophthalmic goitre**, which enlargement is believed to be conservative. The results appear to vary : some observers report that there is no obvious effect ; others affirm that benefit is derived, especially by lessening the tachycardia.

The treatment does not cause pyrexia or any form of constitutional disturbance. The dose of the dessicated gland is 3 to 10 grs. It may be obtained either in the form of a powder or of tablets (3 and 5 gr.). Thymus extract is also recommended in **rickets**, **hæmophilia**, **chlorosis**, and **anæmia**.

2. The Milk of Thyroidectomised Goats.

The theory of this remedy is that when the goat has been deprived of its thyroid its milk will contain an excess of the toxin which is normally destroyed by the thyroid, and hence will tend to neutralise excessive thyroid activity. This method of treatment has obvious disadvantages and it is now usually given up in favour of the next method, which depends upon similar principles and is easier to carry out.

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

The Serum of Thyroidectomised Sheep.

is obtainable in two forms :—
Möbius's Serum, or Antithyroidin.
hyroidectin.

obius's Serum.—This is blood serum obtained from
veeks after extirpation of the thyroid, to which 0·5%
. been added as a preservative. It is said to keep
and is therefore more generally useful than the milk,
which it probably contains a larger proportion of toxins.
um is too irritating for use subcutaneously : it is therefore
the mouth in doses of 8 to 75 ms. (0·5 to 5 c. c.), and it
administered in wine, syrup or milk. The best method
inistration is to put the patient upon a course of 40 to
s in doses of 1 c. c. four times a day then stop it and
levelopments. As a rule impovement is rapid, the patient
s quiet, sleeps better and puts on weight, whilst both the
almos and the swelling subside. The amount of serum
sed varies in different cases : one of those reported by
ler relapsed after two months, but he reacted well to a
course of 50 grams. The amount of serum given cannot
eased indefinitely otherwise there is danger of producing
ms of athyroidism, namely a mild type of myxœdema with
he, apathy and mental stupidity. Dürig reports a case
this happened after the administration of 230 c. c.

Thyroidectin.—This is a brown powder prepared by
ating the serum of thyroidectomised animals. It is sold
ssrs. Parke Davies & Co, and its use is similar to that of
s's serum.

Thyrolytic Serum.

be has prepared an antithyroid serum, which not only
a specific cytotoxin, but also has the power of neutra-
e thyroid secretion. He accomplished this by isolating
leo-proteids and the thyroglobulin of two glands removed
atients with exophthalmic goitre and injecting these into
This serum, being made from human organs, is capable
g great harm to man and must therefore be used very
ly and in small doses only not more than 1 c. c. for
ection. Rogers reports ten cases treated by this serum.
ults were as follows.—three were apparently perfectly
three were arrested from a critical condition and are
hing a cure, whilst the remainder all show more or less
f improvement. These results are very striking, but the
y of obtaining material for Beebe's serum must at present
the way of its commercial use.

Suprarenal Glands.

active principle of the suprarenal bodies is a greyish
ine substance, called **Adrenalin**, which is contained in

CC-0. Jangamwadi Math Collection. Digitized by eGangotri

the medullary portion of the glands. It is very insolu therefore the peparation generally used is . solution of A Chloride.

Different manufacturers have given various name substance, such as Hemisine, Renaglandin, Adnephri renalin and Renostypticin.

Method of preparation.—The suprarenal glands are to pulp and macerated, excluding oxygen as much as in warm water or very dilute acid for 5 hours, and the is then heated to 90°C to coagulate albuminoids. Th extractive is then evaporated and extracted with alcc the adrenalin is then precipitated by means of ammonia.

Various preparations of suprarenal substance are market (such as tablets of fresh gland substance, dry extra but nowadays they are practically abandoned in favour solution of adrenalin chloride.

Adrenalin Chloride Solution.—This is a soluti of adrenalin chloride in 1000 of nomal saline solution, 0·5 per cent of chloretone has been added.

Dose.—5 to 30 ms. by the mouth. When used as a dermic injection it should be diluted 10 times with solution. This solution is easily oxidisable and it turns exposure to air and light: the bottle should therefore be as little as possible.

PHYSIOLOGICAL ACTION OF ADRENALIN.

It cannot be considered a ferment as it is thermostabile. The intravenous injection of a very small dose causes sient but enormous rise of blood pressure and also marked tion of the pupils. If the vagus is intact this rise in blood is accompanied by marked slowing of the heart's action disappears on cutting the vagi and must therefore be stimulation of the cardio-inhibitory centre in the When this inhibition is removed there is both quicken stengthening of the heart's beat, which must be due to action upon the heart itself as it persists after sectio cervical cord. Plethysmographic observations show rise in blood-pressure is due to constriction of the ar which persists, even after complete destruction of the c which must therefore be due to direct action upon the n ture of the vessel walls. Langley suggests that this acti result of a definitely specific stimulation of the sympathet endings.

It has been shown moreover that blood taken from th renal vein during life produces similar effects to adrenalin in a lesser degree, whereas blood from any of the other

JNANA SIM... LIBRARY, Jangamwadi Math, VARANASI Acc. No. 1026 16
CC-0. Jangamwadi Math Collection. Digitized by eGangotri

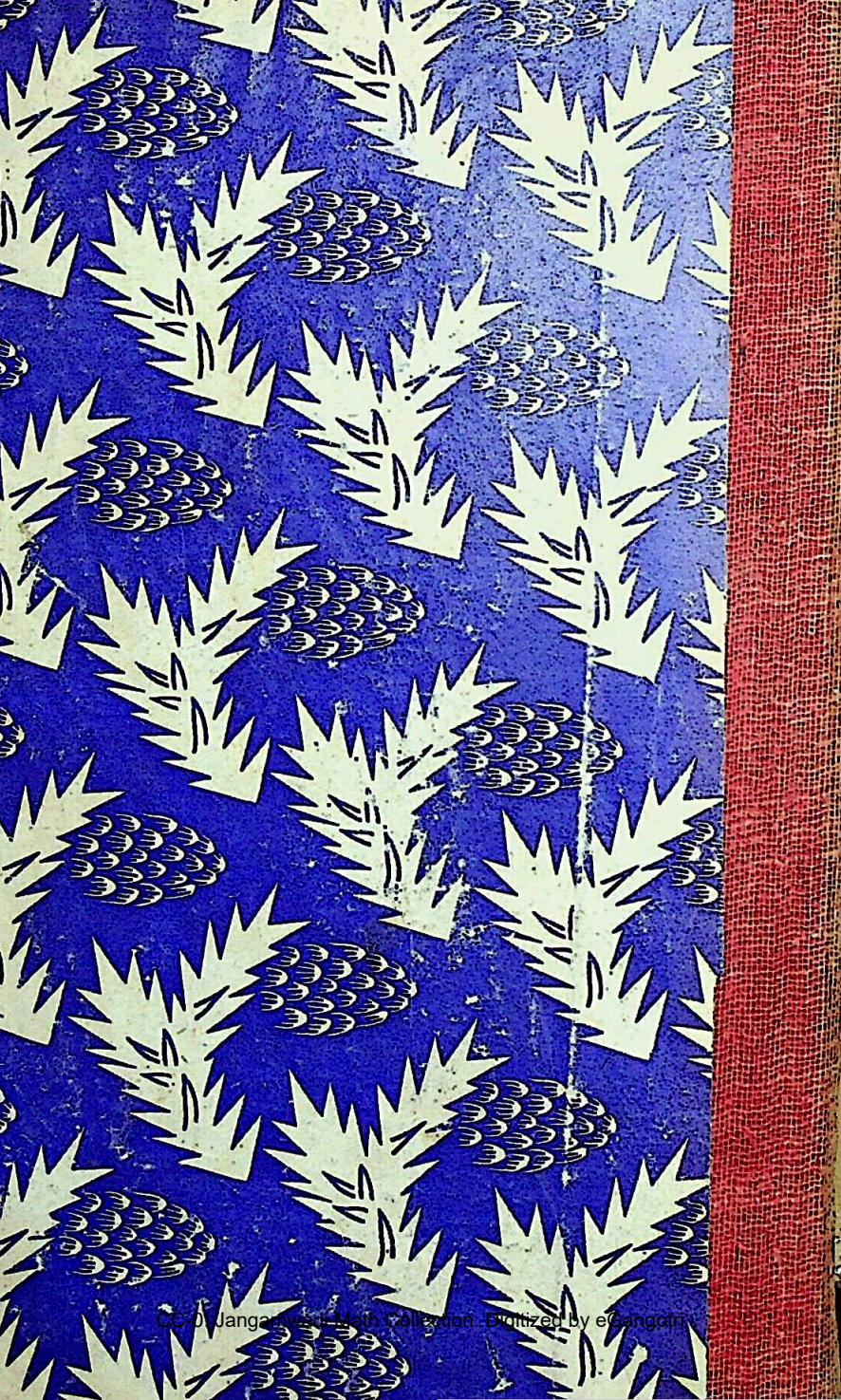
3. T
This
1. M
2. T
(1) A
rams six
phenol
indefinit
besides
This ser
given by
is best
of adm
50 gram
await c
become
exophth
to be u
Alexan
second
be incr
sympto
headac
where

(2)
inspiss
by Me
Möbiu

4.
Bees
contains
lising t
the nuc
from p
rabbits.
of doin
cautious
each inj
The res
cured,
approac
signs o
difficult
stand in

The
The
crystal

CC-0. Jangamwadi Math Collection. Digitized by eGangotri


CC-0. Jangamwadi Math Collection. Digitized by eGangotri